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LIVER DEATHS AND THE COMPLICATIONS OF GALLBLADDER SURGERY

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THE liver is a complete, individualized chemical laboratory. Its functions are so diverse, its physiologic response usually so adequate, that to date, except for extreme or marked cases of liver disease, we have no competent laboratory tests that will indicate either the relative or absolute degree of actual liver function present in a patient before operation. In so far as protein metabolism is concerned the liver receives the entire protein content that is absorbed from the gastro-intestinal tract. Protein material is broken down by a process of deaminization into simpler amino-bodies and prepared for eventual elimination by the kidney in the form of urea with small amounts of uric acid and creatinine. So far as sugar metabolism is concerned the entire alimentary sugar content is stored in the liver cells and liberated as dextrose in response to stimuli from body cells. In regard to fat metabolism it seems most probable that the final metabolism of fat is in a large measure the function of the hepatic cells.

When we consider the role played by the liver, either as a secretory or as an excretory organ, we note (a) its function in the production and elimination of bile; (b) its control of the maintenance of blood sugar level, heat production and heat distribution; (c) its occult function in blood clotting and the control of bleeding. The liver also possesses in remarkable degree the property of regeneration and it has been possible on experimental animals to remove three-quarters of the liver substance without the production of jaundice or without any manifest failure of liver function, and with

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complete regeneration within 8 to 10 weeks. Hypertrophy of the liver does not occur as the result of work or over-function, and probably at all times there are some areas of degeneration sequential to abdominal infection or enterogenic toxins. These areas of degeneration are replaced by fibrous tissue while the normal quantitative amount of liver function is maintained by hyperplasia and regeneration. Adami has indicated that the liver possesses the property of destroying bacteria and rendering innocuous certain chemical and biotic toxins, while Opie has shown the high resistance of the liver cells to infection with colon bacteria, as well as the ease with which the liver is infected by the same coli bacteria when the hepatic cells are injured by alcohol or enterogenic toxins.

On October 14, 1922, before the Associated Physicians of Long Island¹ I stated with much dubiety:

From the clinical point of view we have been impressed with three clinical states that intervene after operations upon the biliary tract. We do not know what is the definite cause of these states, but have felt that they are somehow directly or indirectly associated with an hepatic insufficiency or an hepatic exhaustion. Deaths that occur within the first 24 to 36 hours after surgical procedures on the biliary tract are due to causes that are directly anatomic—hemorrhage, shock, exhaustion. Death from infection, such as spreading peritonitis, is a rather infrequent occurrence. In the three clinical pictures of deranged hepatic function following operation on the gall bladder none of the elements of shock, hemorrhage or cholangitis, *per se*, is present.

Nine years later our viewpoint had been sufficiently clarified by additional clinical experience and research to suggest the term "liver deaths," which was first employed in a paper entitled "Liver Deaths in Surgery of the Gallbladder."² We now hold to the opinion that "liver deaths" are a distinct clinical entity. A slight rearrangement from the original contribution would suggest the following classification:

1. Liver deaths associated with hyperpyrexia and coma—a rapidly developing lethargy, stupor and coma. Death terminates the picture in from 18 to 36 hours.
2. Liver deaths in the presence of a constantly diminishing jaundice—slowly developing stupor and coma; final clinical picture similar to "cholemia death" from cirrhosis of the liver.
3. Liver deaths associated with some unrelated kidney disease—anuria is a factor in the terminal picture. Forty-eight hours after operation there is a clinical picture not dissimilar to shock, with cold, clammy skin; failure in water elimination, and a marked rise in non-protein nitrogen.

In group 1 the so-called "liver deaths" are definite and are the results of a disturbed or altered chemistry incident to liver failure.

In group 2 the cases are relatively in the same position as in group 1. In group 3 the cases are associated with more far-reaching chemical disturbances in which renal function and water balance are pronounced factors.

From time immemorial, coma and liver disease have been associated in the minds of clinicians, and not infrequently the surgeon has had an inexplicable death following rather simple gallbladder surgery and has been unable to comprehend either the cause of the mortality or the mechanism of its production. It has been our impression that these obscure and inexplicable mortalities were in some way associated with either a failure of the liver to exercise its normal and adequate protective function or that as a result of anesthesia, trauma, absorption, hemorrhage and disturbed intro-hepatic physiology, the protection ordinarily afforded by the liver was inadequate.

A study was made of 557 personal cases of gallbladder disease submitted to operation, together with an analysis of the mortality rate. All of the patients were operated upon by the author so that the descriptions used are common to his habit of expression and pertain to all of the cases. Many were operated upon without preoperative preparation by reason of the serious condition when the patient entered the hospital. How many of these patients survived surgery? And of those who died, what was the mechanism of death? Were the preoperative preparation, the surgical intervention and the postoperative therapy competent and adequate? Furthermore, could any reasonable deductions be made as to the complications and mortality that would serve to prevent their occurrence in any future group of patients? To be sure, a better showing could be made if the analysis had been confined to private patients alone. Irrespective of the competency of the surgeon, the relative physical wellbeing of the patient, the stage of the disease and the patient's hereditary background are factors of undoubted importance in insuring recovery after surgical intervention. It seemed wiser, however, to take the "run-of-the-mill," for the conclusions derived therefrom would be applicable to the gallbladder service of any general hospital of like prominence and bed capacity.

There were 39 deaths out of 557 unselected cases, or a general mortality of 7 per cent; there were 8 so-called "liver deaths" giving a mortality per se of 1.4 per cent of the total number of patients, but contributing 20 per cent of the total mortality. In the "liver deaths" there were 2 in group 1; 3 in group 2; and 3 in group 3. The frequency of groups 2 and 3 indicates the increase in the mortality rate in the delayed or late cases of gallbladder disease. In all of the lethal cases there was definite visible evidence of liver

change, particularly in the degree of glissonitis or fibrous changes in the capsule of the liver. Boyce, Beal and McFetridge³ in an analysis of 100 consecutive deaths reported the liver death syndrome in 23 patients, which is approximately the same as our findings of 8 liver deaths in a total mortality of 39, or 20 per cent.

The liver is the great agent for detoxification and the most active Berkefeld filter in the human organism. In every infectious disease of the external biliary apparatus the liver is called upon to exercise its detoxifying function as well as its bacteriolytic power. As a result, there are varying degrees, both qualitative and quantitative, of liver damage and were it not for the remarkable regenerative properties of the liver the continued use of these particular functions might exhaust the capacity of the liver. Failure of "liver protection" after abdominal surgery results in death. These so-called "liver deaths" have peculiarities in onset and clinical course that are distinctive and dissimilar to the usual type of postoperative mortalities.

Boyce, Beal and McFetridge³ summarized the mechanism of liver deaths as follows:

The patient with biliary disease, whether or not gross obstruction is present, always exhibits some degree of liver damage, which is not, however, incompatible with the stress and strain of ordinary life. But, when surgery is undertaken, even under the most favorable circumstances, there are introduced other factors, including the anesthetic, the trauma of the surgical manipulation, the associated drop in intra-abdominal temperature and changes in intra-hepatic and biliary pressure, and with these new factors the liver, already the seat of a pathologic process, cannot cope. As a result, its function promptly fails, and the toxic substances which reach it in the course of normal body metabolism are thrown off undetoxified. Then the liver cells, as they become increasingly unable to function, themselves undergo some necrotic change and themselves discharge into the circulation some additional toxic product which originates in their own degenerating cellular substance.

The next assumption follows logically upon the first. The kidney, which after the liver is the great detoxifying organ of the body, must take up the work of the liver, purely as a matter of physiology, when the detoxifying function of the latter organ fails. But in the kidney the margin of safety is very slight, and it is not fitted to handle even the normal products of body metabolism, let alone, in addition, the toxins liberated by the damaged liver cells. It promptly fails in its turn therefore, and an overwhelming and lethal toxemia is the natural consequence.

We believe, finally, that the so-called "liver death" or liver-kidney syndrome is a single pathologic process in which the hepatic changes always precede the kidney changes. In our opinion, if the patients who die promptly with hyperpyrexia and who exhibit liver degeneration at autopsy could be kept alive long enough, they also would show precisely the same clinical and postmortem renal changes as do the patients who die later with typical symptoms of uremia.

These authors on the basis of their experimental work were able to produce a true replica of liver death in their experimental animals by the intravenous injection of a water soluble preparation of liver material from a patient dying a "liver death" of group 1 type—coma and hyperpyrexia.

The high percentage of mortality in the cholecystostomy cases is directly attributable to the gross infective changes that were present at the time the patient presented himself for operation. Four of five patients that died after cholecystostomy had calculi and there was a history of repeated attacks of biliary colic. It seems axiomatic that biliary colic provides one of the surest indications for surgical intervention. Cardiovascular disease, particularly the myocardial group, have been benefited by the removal of the gallbladder and the institution of surgical drainage.

There is a striking contrast exhibited by patients in their ability to withstand long continued gallbladder and duct disease. This resistance depends upon the social, economic and nutritional level of the patients. Of the 557 patients, 417 were private and 140 were clinic patients; of the 417 private patients, without consideration of the type of operation performed, 20 died, giving a mortality in private patients of 4.8 per cent. In the 140 clinic patients, without consideration of the type of operation, 19 died, giving a mortality in the clinic patients of 13.5 per cent. The most noteworthy difference between the private and clinic patients was in the degree of pathologic change, more manifest gross changes in the liver, and a greater degree of multiple surgical conditions. It may therefore be said that in the clinic patients there was a larger increment of pathologic damage as the result of delay in seeking surgical intervention than that which obtained in the private patients.

A liberal interpretation of our mortality statistics would indicate that there is a certain number of patients who from the very nature of their disease could not be cured. It is also fair to state that by earlier operation some of these patients would have been cured by preventing the development of malignancy. Thirteen malignancies in this series were at the time of operation beyond any remedial measures. All of them had gallstones and gave a history of long continued gallbladder disease. Surgical intervention at an earlier period would have completely obviated these mortalities. Dublin⁴ in a study of life expectancy after surgery for gallbladder disease reports that drainage showed the highest mortality, 155.7 per cent of the expected, largely due to the poor results in those drained for stones, 214.9 per cent. Among men, the drainage cases had a mortality of 233.3 per cent of the expected, but the experience on women was favorable, 65.6 per cent of the expected.

The effect of a concomitant and associated jaundice adds a complicating factor of tremendous importance to gallbladder surgery. Irrespective of the type or cause of the jaundice, the pernicious effect of an icterus upon the adequacy of liver function is one that is known to all clinicians.

Acute or subacute pancreatitis is a complication of gallbladder surgery with a high mortality. Fulminating hemorrhagic pancreatitis is not considered in this appraisal but rather that type of pancreatitis characterized by an acute edema of the head of the pancreas with pressure necrosis of the capsule and the escape of pancreatic ferment. The possibility of pancreatitis should be anticipated when a male patient is seen during an acute gallbladder attack, with or without a previous history of gallbladder disease. These patients, in addition to the general clinical picture of gallbladder disease with colic, complain of intense pain transversely above the navel and extending across both sides of the abdomen, and at almost the same location across the back. The temperature remains constantly elevated and there is always some degree of icterus. On opening the abdomen numerous small areas of fat necrosis are apparent. These may occur as minute white semicrystalline deposits on the omentum, mesentery or gallbladder. The gallbladder is edematous and usually contains stones. Marked hypervascularization exists throughout the entire right upper quadrant. The gallbladder itself will ordinarily be surrounded by the omentum and the foramen of Winslow will be obliterated by a fibrinoplastic lymph material. On separating the omentum from the gallbladder and liver a peculiar "prune juice" fluid escapes from Morrison's space. This fluid has a very intense chemical activity and produces a pale, green, gangrenous area wherever it touches.

Pancreatitis occurred 21 times as a complication in 557 cases of gallbladder disease, representing 3.7 per cent of the series, with 5 deaths, or a mortality of 23.8 per cent. It occurred five times as frequently in the male as in the female. The causes of death in the gallbladder cases complicated by pancreatitis were as follows: (1) auricular fibrillation, death occurring on the eighth postoperative day; (2) pulmonary embolism, the patient dying at the end of 48 hours; (3) retroperitoneal phlegmon, with death on the twelfth day; (4) peritonitis, death occurring on the eleventh day, and (5) wound dehiscence with secondary intestinal obstruction, when the patient died on the twenty-second day. It is an interesting observation that the immediate postoperative condition of the male with a gallbladder and pancreatic condition is, as a rule, more disturbing and complicated than a similar condition in the female; yet, the

eventual relief of symptoms in the male is equal, if not many times better after full recovery than that which obtains in the female.

Tests of the excretory function of the liver, such as the icterus index, urobilin in the urine and the dye tests such as phenoltetrachlorophthalein or bromsulphthalein are useful both diagnostically and as a basis for a clinical estimation of some phases of liver capacity. Tests such as the glactose tolerance are also valuable as indicating the part played by the liver in carbohydrate metabolism, while tests directed at the intermediate products of protein metabolism such as the nitrogen partition of the blood and of the urine are indeed valuable in regard to this aspect of liver physiology, but are insufficient to answer the question as to what will be the physiologic response of the liver in the event that a laparotomy is performed.

There is abundant literature on the uncured cases of gallbladder surgery; of the patients who have a continuance of their symptoms, or originate a new syndrome after a surgical intervention. Post-operative sequelae do arise from mistaken diagnosis; from chronic glissonitis or fibrous perihepatitis; from a continuing cholangitis from overlooked calculi in the common duct; from a chronic interstitial pancreatitis; from a benign stricture of the common duct, and from what has been called the post-cholecystectomy syndrome or by its new appellation "biliary dyskinesia" or sphincteritis of Oddi.

Water balance is obligatory and essential for the metabolism of proteins and in the synthesis of protein by-products. The diagnosis of uremia as a cause of death in an individual who previous to a laparotomy had no kidney impairment is a very insecure designation. The liver exercises a great influence on maintaining normal water balance. The so-called "reflex suppression of urinary function" following operative intervention on the external biliary apparatus may be appraised as a basic disturbance of water metabolism.

Lieber and Stewart⁵ in a study of the renal changes following biliary obstruction, with decompression operations on the biliary tract, found that with the exception of bile pigmentation of the parenchyma there were relatively few regressive changes with complete and permanent common duct obstruction. Furthermore, the same authors could not observe impairment of renal function from complete biliary stasis in the majority of cases. Such regressive changes as were present increased markedly with the operative relief of the obstructive jaundice. The same regressive changes were present, however, in many non-jaundiced surgical patients. Helwig and Orr⁶ demonstrated that renal lesions of relatively the same

type and degree were found after traumatic pulpectomy and in hemorrhagic necrosis of the liver.

In the body physiology there are two types of water—^{7, 8} the so-called preferential water and the water of urinary excretion. The major factor in the preservation of life is the preferential water, that "X" quantity of water which is absolutely essential for the vital function of the individual cell. If this amount of water is depleted below a certain minimum, cell death occurs. It is depression of this preferential water below normal requirements that makes dehydration such a significant and dangerous clinical condition. Loss of body fluid of 6 per cent of the body weight produces a clinical condition of dehydration; a loss of 8 per cent is dangerous, and 10 per cent lethal.⁹ It is interesting that a person may lose 50, 60, or 70 per cent of their body fats, proteins and carbohydrates and yet be able to sustain life, while a loss of 14 to 20 per cent of tissue water is attended by grave danger. The conservation of preferential water is the outstanding protective response of the body to water loss. The loss from all other emunctories is restricted in order to conserve preferential water. It follows therefore that the loss by insensible perspiration is diminished, giving the dry skin and mucous membrane. Furthermore, the amount of urinary water falls below the amount necessary to carry away the by-products of metabolism. The non-protein nitrogen content of the blood rises and a false impression is created that the condition is one of uremia or renal failure. It is our opinion that when this clinico-chemical condition is recognized there is no actual pathologic change in the kidney, for the kidney under proper stimulation by forced water intake will resume its water output and the non-protein nitrogen of the blood will also fall. In the third liver group this factor of hypohydration is probably the predominant effect. This may account for the fact that various observers have been inclined to attribute the underlying factors for this group to a defect of kidney function. Certainly there is a defect of renal elimination but it is secondary to obscure and unknown factors in hepatic function.

The physiologic competency of the liver is directly responsive to the availability of tissue water. The adequacy of water intake and the acceleration of its circulation are factors of preeminent importance in safeguarding a patient preoperatively and postoperatively. It is significant that the gastro-enteric hepatic circulation of fluid varies from 7,500 to 10,000 c.c. per diem.¹⁰ It is probable that outside of grave cardiac disability the acceleration of circulation of fluid is not of great importance, and the physiologic desiderata are the mobilization of water and the adequacy of its supply. Water metabolism embraces two distinctive phases: (a) the intake and

(b) the output. Intake water is readily controlled and may be accurately measured, (Fig. 1) being the sum total of all fluid taken into the body as fluid, per se, or as the water complement of food. The

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WATER AND CHEMICAL BALANCE

Department of Surgery		History Number	
Name	Ward	Date of Admission	
Weight			
INTAKE (in cc.)	Date		
	Mouth		
	Rectal Retained		
	Infusion		
	Clyses		
	Total 24h. (blue ink)		
OUTPUT (in cc.)	Urine		
	Stool (estimated)		
	Skin Loss (estimated) *		
	VOMITUS or Tube Drainage (new sample)		
	Total 24h. (red ink)		
	SUMMARY (if + blue ink) (if - red ink)		
	Glucose (in grams)		
(Indicate in red ink)	6000 cc.		
	5000 cc.		
	4000 cc.		
	3000 cc.		
	2000 cc.		
	1000 cc.		
Remarks. Infusion Reactions. Chills- moderate, severe.			

Fig. 1. A Water-chemical Balance Sheet.

items of output are difficult and vary with change in the character of the patient's pulse, temperature, respiration and emunctories. The water loss can be catalogued as follows: (a) cutaneous water loss, 1000-1500 c.c. per diem; (b) urinary water loss, minimum 500 c.c. per diem; (c) stool water loss; (d) respiratory water loss, and (e) water loss in vomiting or by gastric drainage. It must be recognized that the water loss from the skin surface varies with temperature of the environment—the dryness or the humidity—

and the muscular labor upon the part of the individual, as well as the presence or absence of metabolic disturbances associated with increased oxidation (hyperthyroidism) or fever. Newburg indicated that as much as 10 liters of water may be lost through the skin in a day. It should also be recognized that the loss of water by the skin is obligatory and will not fall much below a very definite quantity. The organism in order to maintain the cutaneous loss will withdraw water from the kidney so that a diminished output of urinary water will indicate the beginning of dehydration. The estimated minimum of urinary water necessary to carry off the solid matter and to keep the specific gravity at 1.030 is 500 c.c. per diem. Any urinary water below 500 c.c. means the retention of urinary products, a rise in the non-protein nitrogen in the blood, which in turn increases toxic retention, elevates temperature, causes more loss of water from the cutaneous surface and initiates a dangerous state of dehydration.

In jaundice there is a reduction of stored glycogen, hence the necessity of restoring glycogen by an excess of dextrose. Dextrose neutralizes exogenous and endogenous toxins. It assists markedly in the repair of damaged liver cells, aids in their protection against toxic material and lessens their sensitivity to necrosis. It has been our experience that it is an important element in the reduction of the prolonged coagulation time that is found in jaundice. If the intake of water is sufficient, dextrose aside from its many other functions lessens the tendency of the patient to lose water. However, dextrose in excess, as well as too much saline, immobilizes tissue water and produces an edema, as is frequently observed in surgical patients.¹²

The dictum of "force fluids" is per se harmful. The routine procedure of giving at frequent intervals 1000 to 1500 c.c. of normal saline intravenously is fraught with danger to the patient. Fluid intake should be calculated on the basis of fluid loss and fluid retention and the patient not flooded with uncontrolled or injudicious quantities of water and dextrose. Fantus¹³ has indicated that "the sicker the patient, the more fluids are forced." The object of treatment should be water balance and not flooding of the system. It is obvious that gross quantities of fluid lost from the stomach also means a loss of chlorides. Such loss must be made up by the intravenous introduction of hypertonic solutions of saline. A fall in the chlorides produces the chemical state of hypochloremia,⁹ with its attendant alkalosis. Continued loss of chlorides by vomiting or gastric drainage is as prejudicial to the safety of the patient as gross diminution in tissue water.

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INTERNAL FIXATION OF FRACTURES (INTRACAPSULAR) OF THE NECK OF THE FEMUR

Report of Twenty-one Cases

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THE method of treating fractures of the neck of the femur by internal fixation, with metal nails or screws, is not a recent one. However during the past few years the technic has been improved which has caused the procedure to become more generally used. The improvement of the technic maintains better fixation, has lessened the operative risk, as well as the mortality rate. No fracture problem has interested bone surgeons any more in the recent past than the procedure of internal fixation of the intracapsular fracture of the femur. We believe the main reason for this interest has been on account of the poor results such as too high per cent of non-union and mortality which has been encountered by other methods of treatment namely: the Whitman abduction method¹ and the bed traction treatment.

A review of the reports of non-union by other methods of treatment show that there are various findings of non-union from 50 per cent to no non-unions; the latter reports are very rare. The average non-union in most of the cases reported by other methods is about 40 per cent with the mortality rate entirely too high. Such results indicate to the authors that the abduction plaster cast or bed traction methods are not satisfactory.

Certain technics of internal fixation of intracapsular fractures are spoken of by their authors as simplified. They are simplified as regards the amount of surgery and shock to the patient when the procedure is indicated and performed by experienced surgeons. The operation, however, is not a simple one. It demands the best surgical judgment and ability as to its indications and procedures of the operation. Serious catastrophes can result from the operation by inexperienced surgeons.

The history of the development of internal fixation of intracapsular fractures dates back to three quarters of a century ago. According to R. Matas², Bernhard V. Langenbock stated that he

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experimented with this idea in the fifties of the last century, and that F. Koenig resorted to pegging of broken fragments as early as 1875.

A review of the literature by the authors shows that Meyer³ in 1893 discussed old un-united intracapsular fractures of the femur treated by nails, and that Nicolaysen⁴ in 1897 also discussed the treatment of fractures of the neck of the femur. His method was



Fig. 1, A. Showing fracture through the neck of the left femur with rotation of the distal fragment. Treated by internal fixation. (Moore's nails.) Case 1.

to drive a spike into the femur, nailing the fragments without making an incision in the skin, in other words a subcutaneous nailing. Nicolaysen stated that uniformly good results were obtained. Cheyne⁵ in 1891 had an article to appear in the British Medical Journal entitled "Fractures of the Neck of the Left Femur, Pegging together the Fragments." Gillette⁶ in 1898 reported in the Trans-

actions of the American Orthopaedic Society where he used ivory pegs for such fixation in fractures of the neck of the femur. Martin⁷ was using wood screws for fixing the intracapsular fracture as early as 1920. He operated under local anesthesia and reported good results. His cases were reported in the Southern Medical Journal in 1924. In the recent past Johannson^{8,9}, Smith-Petersen¹⁰, Wes-



Fig. 1, B. Showing amount of union two months following operation. Case 1.

cott^{11,12}, Gaenslen¹³, Moore¹⁴, Knowles and others have made valuable contributions to the improved technic of internal fixation of fractures of the neck of the femur.

Internal fixation of fractures of the neck of the femur is not a panaceal treatment and it should not be considered as such. Taking for granted however, that even though we will not obtain any more union in fractures of the neck of the femur by the internal fixation

method we feel that we are justified in carrying out such technic because:

- a. There will no doubt be a lessened mortality.
- b. The mental attitude of the patient is entirely changed; as a matter of fact, such patients as have been operated on with this



Fig. 1, C. Union and position four months following operation. Patient doing manual labor, seven months following operation. No disability. Case 1.

technic feel that they have a few more years of normal life and activity, instead of being delegated to a life of invalidism. It is only necessary for the surgeon to see the mental attitude of a patient who has had the operation to become convinced of the optimism of the patient. One of our cases had broken her hip a few years previous to her recent hip fracture and had been treated by the Whitman cast method. It was, indeed, convincing as to the patient's

happiness and comfort and definite ideas as to the advantages of the method of internal fixation as compared to the cast method.

c. The economic status is improved, such as a shortened hospitalization and nursing.

d. The patient is usually out of bed, sitting up within a week or thereabouts following the operation. There is no necessity for pro-



Fig. 2, A. Fracture of the neck of the left femur ten weeks following injury. Nonunion resulted even though excellent reduction (closed) was done immediately after injury and plaster cast applied. Radiograph showing position ten weeks following removal of cast. Patient refused continuance of plaster cast treatment and was therefore referred to the authors. Case 2.

longed cast fixation which invariably causes disabilities about the hip and knee and other complications which may and do cause death.

The cases in this series are 21 in number; the oldest was 85 years old, the youngest 28 years old, the average being 58 years. There

were 7 males and 14 females. The oldest postoperative case is two years and ten months. No death occurred. There were 13 transverse fractures, 1 impacted and 7 oblique. In 14 cases spinal anesthesia was used, in 4 cases local, in 3 a combination of nitrous oxide and ether. Excluding a compensation case under hospital observation 34 days, the average period of hospitalization was 10 days,



Fig. 2, B. Exploration showed viable head, reduction accomplished, fixation carried out. Showing lateral radiograph following reduction and fixation with Moore's nails. Case 2. (Plate reversed.)

the shortest being 5 days. In two cases there was non-union. There is no doubt that in both cases the patients commenced weight bearing too early, were not cooperative, and in one case there is a possibility that an interposition of soft structures between the fragments was present. In neither of these cases has the fracture been explored.

We feel that previous to the use of the technic of taking lateral views and the reduction method as described by Leadbetter¹⁵ in hip fractures, that at least 10 per cent of non-union cases were due to improper reduction. With such valuable contributions there is no just reason now for any hip fracture not to be properly reduced in



Fig. 2, C. Union and position three months following operation. Good functional results, good union, no disability. Case 2.

the early stage. Proper reduction is one of the most important procedures in treating intracapsular fractures.

Carrell¹⁶ states that factors other than imperfect reduction and fixation which influence union in many fractures are found (a) in relation to the anatomic distribution of the blood vessels in the femoral head as found and described by Wolcott¹⁷ and Chandler and Kreuscher¹⁸ and others, and (b) to interposition of soft tissue

between the fragments. Carrell states that the femoral head suddenly deprived of the major blood supply following a fracture may undergo aseptic necrosis. When approximation is adequate for revascularization through the femoral neck the chances of union are good. It is perfectly evident, therefore, that the ideal treatment in



Fig. 3. *A.* Fracture with displacement of the neck of right femur. Immediate treatment by internal fixation. (Moore's nails.) Case 3.

fractures of the neck of the femur is, (a) reduction, (b) fixation, thereby preventing motion and (c) no weight bearing until union is present.

Carrell states that he has not been impressed with the importance of soft tissue interposition and believes that manipulation displaces all but a few remnants which do not interfere greatly with revascularization. Carrell found that in several early cases exposed

after a closed reduction had been done no appreciable soft tissue was found intervening. He further states, however, that when the fracture had been exposed before any reduction was attempted portions of the capsule were invariably found between the fragments. Carrell states that (as is well known) in operating on the old cases soft tissue is always found interposed.



Fig. 3, B. Showing reduction (lateral view) with internal fixation applied. Case 3.

Cubbins¹⁹ and Callahan have frequently found an interposition of the torn periosteum between the fragments on doing an open operation on a fresh case. Cubbins states that in the cases which he has observed, the periosteum and synovia have been detached from the proximal portion of the distal fragment but remain attached around the osseocartilaginous border of the head and that this mass has dropped as a curtain between the two fragments.

Cubbins states that he found that the oblique fracture of the neck of the femur in instances definitely penetrated the anterior capsule and that such a condition precluded the possibility of reducing these fractures by any blind method. Cubbins concludes that previous to the fixation operation, whether they can or can not reduce the neck fractures, they open and inspect the fracture.



Fig. 3. C. Union and position three months following operation, good union and functional results, no disability. Case 3.

The various advantages and disadvantages in certain types of internal fixation will not be discussed. It is our feeling that the surgeon should use the method with which he is most familiar. We prefer the Moore nails¹⁴, because they are easily applied, they have three points of fixation which produce a certain tension which prevents displacement. We have found that three nails inserted at

different levels and angles through the fragments of the femur neck fracture into the femur head will stand more strain and maintain better fixation than one large nail alone. The Moore nails displace less bone and if an error is made in one nail's application it can easily be re-applied without too much trauma or bone displacement within the fragments. As a matter of fact, Moore recommends that several drill holes be made up through the neck and into the head thereby leaving channels through which capillary loops can travel upward producing a better blood supply and osteogenesis to the head. Moore states that Bozson who introduced this idea unwinds a regular bone drill and believes that he leaves small bone chips along the passage way. Moore states that he usually places from four to six drill holes about the head and neck; however, if he has to re-insert any of the pins he takes this into consideration in numbering the additional holes.

We prefer spinal anesthesia for most cases, provided the general condition permits. We have not usually been able to obtain the desired relaxation by local. General anesthesia should only be given to the uncooperative patient or the individual with too low blood pressure.

Our technic is similar to the one described by Moore with a few variations. Briefly it is as follows:

The patient is placed on a fracture table with a cassette and proper padding beneath the patient. The fracture is reduced by the Whitman-Leadbetter technic. Radiographic checks are then made, always taking lateral and antero-posterior views. If reduction has been accomplished an incision about 4 inches long is made directly over the greater trochanter, the nails are driven in and radiographic rechecks with the same technic as described above is carried out. If the nails are found to be properly applied the distal fragment is impacted against the proximal fragment, the nuts are then screwed up and the nails are gently tapped, a small wire is applied around the nails and the nails are then cut away near the nuts and the wound is closed. Nothing but a gauze-adhesive dressing is applied. The patient is allowed to move about in bed at will. It is insisted that he sit up in a semi-reclining position by the second day and he is usually out of bed in a wheel chair on the fourth or fifth day, and going home by the eighth or tenth day.

No weight bearing should be allowed until radiographic checks show a continuity of the bone and a disappearance of the fracture line which seldom takes place before three months following the operation. The usual radiographic findings when union occurs in these cases is that there is a definite continuity of bone tissue and a disappearance of the fracture line. No external callus is present. Frequent radiographic checks should be made of the fracture following weight bearing and the patient should be able to discard all supports within four or five months following internal fixation in the average fracture.

We have done internal fixation in fractures of the neck of the femur with the Moore nails in certain delayed or non-union cases.

Such method, however, should not be used unless full exposure and exploration of the head and fragments are carried out so far as viability of the head is concerned after which the interposed tissue between the fragments is cut away and the bone over the fragment ends curetted. Osteoperiosteal grafts should be placed around the fragments. We have done two such cases with good results. We feel that heretofore viable femur heads have been removed in old intracapsular fractures which should have been nailed as described above thereby obtaining better functional hips than by certain reconstruction operations.

We do not suggest that the nails be removed unless they become loose and cause pain. In two cases we have had to remove the nails which was done under a local anesthetic. The chemical reaction of the nails in such area is no different than the chemical reaction which follows the introduction of such material in all other bones of the body; in other words, some of these nails have to be removed in certain individuals, while others do not demand it.

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PULMONARY ABSCESS IN ADULTS AND CHILDREN

Clinical Observations

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ABSCCESS of the lung is and probably always will be a serious disease; but tremendous advances have been made in its treatment and the general prognosis of the disease has improved to the point where we may say in general that most of the patients will get well. Prognosis more accurate than this general one is misleading because of variations in many of the important factors.

Many years ago I made the statement that in every case of suppurative disease of the lung there should be a consultation among the medical men, the surgeon, the roentgenologist, the pathologist and the bronchoscopist. The statement was challenged, the criticism being made that the machinery was too ponderous. But time has shown the plan to be a good one. No one could visit our chest conferences at the Temple University Hospital and fail to be impressed with the value of a thorough presentation and discussion of all phases of the particular case from the various viewpoints. At such a conference there are determined in a case of pulmonary abscess, the diagnosis, the further diagnostic steps to be taken, the localization, the pathologic conditions present, the degree of natural drainage, the possibilities of improvement of peroral drainage by bronchoscopy, the advisability of instituting or postponing external drainage.

STUDY OF THE LIVING PATHOLOGY

There was a time when pathologic studies were limited to autopsies in fatal cases. Today by means of the bronchoscope we are able to study the living pathology in the case of a patient actually under treatment.¹

It must be remembered, however, that bronchoscopy is an addition to, not a substitute for, other methods of study. Physical examination and roentgen-ray studies are just as necessary as they ever were, but the supplementary bronchoscopic examination as to living pathology is invaluable.²

TREATMENT

Abscess of the lung when not due to tuberculosis calls urgently for drainage.³ In some cases ciliary, expectorative and postural drainage are adequate; such patients often get well under medical

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care and management. When, however, the channels, bronchial or fistulous, leading from the abscess into the tracheobronchial tree are obstructed a fatal termination is to be expected unless drainage is established. In some of these cases ample drainage can be established by bronchoscopy; in such cases recovery under medical care and management is the rule; if bronchoscopy fail, external surgery offers the only hope.^{2,3}

It seems, in a way, unfortunate that bronchoscopy has been advocated as a method of treatment of suppurative disease of the lung. While it is true that in case of inspirated foreign body no treatment other than bronchoscopic removal is worthy of a moment's consideration, this is very far from being the case when the suppuration is of other than foreign-body origin. In the latter case the bronchoscope is merely a bronchial speculum, and as we have said before,¹ has the same relation to intrathoracic disease that the vaginal speculum has to pelvic disease. The gynecologist may find (a) conditions that require nothing more than medical care and management; or (b) conditions that require external operation; or (c) suppuration that can be drained with the aid of the vaginal speculum. But in no case does he feel that he has made a complete study of his patient's case without a specular examination. It is true that the bronchoscope cannot enter the peripheral bronchioles, but neither can the gynecologist see into the adnexa. Nevertheless, the bronchoscopist can, with the aid of the tussive squeeze, remove pus and secretions from the periphery of all five lobes of the lung. It has been stated that the upper lobe cannot be drained by a straight and rigid bronchoscope. This is an error. Vertebrated aspirating tubes can be put up around the corner into the upper lobes; but they are not necessary except in cases of obstruction of the upper lobe bronchi. In such cases, after the obstruction is removed, and in all other cases, the tussive squeeze brings the pus down to the main trunks from which it is readily removed by bronchoscopic aspiration.^{4,5}

It is difficult to give definite indications for bronchoscopic treatment in pulmonary abscess. In a general way it may be stated that in cases of abscess near the root of the lung the seriousness of external drainage as compared to that in peripheral abscess renders the use of bronchoscopic study and aspiration advisable before deciding to resort to the relatively serious operation of external drainage in the root area. Fortunately it is in precisely this group of cases in which bronchoscopic aspiration has been of greatest aid. In the foregoing statement we do not for one moment question the necessity for drainage of abscess in the root area, nor in the mediastinal

area, but merely make a separate grouping of these cases for the consideration of bronchoscopy.¹

In cases of bronchial obstruction any external surgery short of lobectomy distal to the obstruction is inadvisable before the bronchial obstruction is removed; for the obvious reason that any remaining pulmonary parenchyma distal to an obstructed bronchus involves the probability of recurrence of abscess formation. It therefore would seem advisable to call upon bronchoscopic methods to remove bronchial obstruction in cases in which obliteration of pulmonary parenchyma distal to the obstruction is not a surgical objective.¹

In evaluating the aid of bronchoscopy in the medical care and management of pulmonary abscess we should never lose sight of the fact that it not only drains the abscess cavity but it also drains the tracheobronchial tree. In the drainage of pulmonary abscess by thoracotomy the tracheobronchial tree is not drained, especially if as is usually the case the cough reflex, the natural mechanism of drainage, is annihilated by morphine and other anti-tussive drugs.⁸ Bronchoscopic aspiration and avoidance of all anti-tussive remedies are essential aids in the after care of patients whose tracheobronchial tree is not drained following a thoracotomy.

Though in a small percentage of cases of chronic pulmonary abscess good results have been obtained by bronchoscopic clearing away of obstructions and aspiration of pus, yet it cannot be too strongly emphasized that no pulmonary abscess should be allowed to become chronic without giving the patient the benefit of bronchoscopic aid in arresting the abscess in the acute or subacute stage. The efficiency of bronchoscopic supervision of drainage is, broadly speaking, inversely as the duration of the abscess.

All of the foregoing points are illustrated by the following clinical observations.

REPORTS OF CASES

CASE 1. A man, aged 53, was referred for diagnostic bronchoscopy because of a "cigarette cough" of long duration, that recently had become productive. A roentgen-ray examination by Dr. W. F. Manges showed a large abscess with fluid level in the right lower lobe. Bronchoscopy revealed obstruction of the right lower lobe bronchus by fungations. Bronchoscopic diagnosis, malignant disease. Histologic diagnosis, based on bronchoscopic biopsy, squamous-cell carcinoma.

The patient was irradiated by deep roentgen-ray. Two months later all roentgen-ray signs of abscess had completely disappeared and there were no shadows indicative of other disease; the cough was again dry. One year later the growth recurred and went on rapidly to a fatal termination.

Comment: The case is important for a number of features: (a) The occurrence of a large abscess cavity secondary to bronchial obstruction by endobronchial carcinoma. (b) The disappearance of the abscess as a result of arrest and shrinkage of the malignant growth. (c) The diagnosis of carcinoma by bronchoscopic biopsy in a patient with an abscess showing a fluid level but no roentgen-ray evidence of neoplasm. It does not seem to be generally realized that all the signs and symptoms of an inflammatory disease are primarily presented in carcinoma of the lung. In such cases there is often nothing to suggest a malignant process. Bronchoscopic biopsy affords the only means of positive diagnosis.

CASE 2. A man, aged 42, was referred for diagnostic bronchoscopy by Dr. Hobart A. Hare. The symptoms were irregular fever and dry cough, following a typical pneumonia involving the left lower lobe. A roentgenogram by Dr. David Bowen showed a dense shadow in the left lower lobe, close to the ribs posteriorly, with no fluid level. Bronchoscopy showed a compression stenosis of the left lower lobe bronchus; but no pus. A posterior branch orifice of the left lower lobe stem was filled with granulations. A small spiral aspirating tube was inserted through the bronchoscope and gently insinuated. The bronchus led off posteriorly. About 10 c.c. of pus were obtained in the collector but no pus appeared in the bronchial orifice after withdrawal of the collector. This pus showed a mixture of pyogenic organisms. A roentgenogram taken immediately after bronchoscopy showed a fluid level in the dense area. We advised external drainage which was done by Dr. John B. Deaver. Recovery followed in about 3 months.

Comment: Our opinion in favor of external drainage was based on the bronchoscopic evidence that though the suppurative focus was reachable by a slender bronchoscopic aspirator there was no drainage by tussive squeeze, and little hope of establishing adequate drainage by way of the tracheobronchial tree. On the contrary there was good reason to expect that obliteration of the suppurative focus by cicatrization after external drainage would result in complete cure with no bronchiectasis and no residual purulent expectoration. Moreover the peripheral location of the focus and probable adhesive pleuritis seemed beforehand to render the case an ideal one for external surgery and so it proved to be.

CASE 3. A boy, aged 19, had pneumonia of the right lower lobe. After the crisis the temperature was practically normal for about ten days. Then irregular fever and a dry hacking cough developed. The physical signs indicated a failure of the right lower lobe to clear. The roentgen-ray examination was reported as showing a shadow over the entire right lower lobe obliterating the diaphragmatic line, but without definite indication of abscess. On bronchoscopic examination there was at first no pus visible anywhere. The orifice of the middle-lobe bronchus was closed with a plug of mucosal slough. On removal of this with bronchoscopic forceps there was suddenly a copious gush of pus from the middle lobe orifice. After aspiration, pus continued to reappear copiously for about six minutes, then the flow gradually diminished.

Roentgen-ray examination immediately after the bronchoscopic aspiration showed clearing of the lower lobe shadow and a very definitely localized empty abscess cavity thought to be in the lower lobe. The next day a very low fluid level could be made out, and the cavity was obviously diminished in size. Expectoration was copious. Recovery followed in two months under medical care and management without repetition of the bronchoscopy.

Comment: The bronchoscopy definitely localized the lesion in the middle lobe whereas in the roentgenogram and by the physical signs it was impossible to differentiate as between a lower and a middle lobe lesion. The removal of the plug in the middle lobe orifice emptied the abscess and promoted cicatrization by drainage that reestablished the defensive power of the lung. Medical care and management were curative in this case after they were supplemented by bronchoscopic clearing away of obstruction and restoration of the patency of drainage channels.

CASE 4. Miss X., aged 46, had had irregular fever and a dry hacking cough for two years. She expectorated blood in quantities of a tablespoonful or two but had not produced any sputum for examination during 3 months in a sanatorium for diseases of the chest. The physical signs were not very definite but a slightly impaired percussion note and coarse rales were noted over the right side anteriorly. At bronchoscopy pus was found discharging from below upward through the distal wall of the right upper lobe bronchial orifice, at first yellow, then mixed with blood. Pus aspirated. Bronchoscopic diagnosis, interlobar abscess discharging through a fistula opening into the right upper lobe bronchus close to the orifice. Bacteriologic report: non-hemolytic streptococci and micrococcus catarrhalis group. Smears, cultures and guinea-pig inoculations were all negative for tubercle bacilli. Bronchoscopic aspirations were used to supplement medical care and management. The discharge grew less and less and in a month the fistula had closed. The hemoptysis ceased and the temperature came to normal. The patient has remained well for 5 years.

Comment: This case is a good example of the aid of bronchoscopy in the diagnosis and treatment of non-tuberculous interlobar pulmonary abscess. Had it not been possible to establish adequate endobronchial drainage the condition would have called for thoracotomy. The non-tuberculous character of this case was established only by cultures and guinea-pig inoculation using material aspirated bronchoscopically from the interlobar abscess cavity.^{5,6}

CATHETER ASPIRATION OF PULMONARY ABSCESS

A catheter can be readily put down into the lung through the nose or mouth and pus aspirated. The most remarkable effect has been observed by Chevalier L. Jackson and myself in our clinic at the Temple University Hospital, from the very frequent aspiration of pulmonary abscess by the nurse using a catheter passed through a tracheotomic wound. Whenever the breathing sounds indicate the presence of pus in the trachea and larger bronchi the nurse puts

down the catheter attached to the negative pressure aspirator and cleans out the tracheobronchial tree. If the cough does not squeeze up the pus into the larger tubes bronchoscopy is called for to clear obstruction and reestablish efficiency of catheter drainage. The method is well adapted to both acute and chronic pulmonary abscess; but, of course, the most prompt and satisfactory results are obtained in acute abscesses. Results are slower in chronic abscesses of very long standing with thick walls lined with pyogenic "membrane." The harmlessness of the frequent insertion of a sterile soft rubber catheter into the tracheobronchial tree has been amply demonstrated by its use thousands of times in acute and chronic cases other than pulmonary abscess. It is part of the routine care of all patients with tracheobronchial suppuration in whom tracheotomy has been necessary for any reason.

The following case is a good example of catheter aspiration in acute pulmonary abscess:

CASE 5. A boy, aged 3, was admitted to Temple University Hospital for the treatment of chronic laryngeal stenosis following an acute laryngotracheobronchitis. Tracheotomy had saved the child from asphyxia; but after recovery from the acute illness the laryngeal airway was found almost totally obliterated by loss of laryngeal cartilaginous framework and cicatricial contraction. We commenced treatment of the laryngeal stenosis and were making good headway when there suddenly developed a high, septic fever, ranging from 101° F. to 105° F. with respiratory rate ranging up to 55. The pulse was from 120 to 150. The physical signs were those of extensive, acute, right pneumonitis. Roentgenograms were reported as follows: There is a large cavity with a fluid level in the right side of the chest. The position of this fluid-containing cavity in the right axillary line makes it difficult to localize the collection in any lobe of the right lung unless there is distortion of the interlobar septa. The collection is immediately lateral to the right hilum and between it and the right axillary line one finds some heavy pleural thickening. Throughout practically all of the right lung one finds heavy fuzzy density except at the extreme lateral portion of the right base. The changes are attributed to a suppurative process. Similar changes of lesser degree are seen on the left side.

Bronchoscopy revealed thick plugs of coagulated pus in the right bronchus. When these were removed with aspirator and forceps a free flow of pus into the right main bronchus was established. This was aspirated clean. Fluoroscopic examination showed a good evacuation of the cavity. Catheter aspirations through the outer cannula were repeated by the nurse every hour and as much oftener as indicated by the breathing sounds showing the presence of pus. Improvement was prompt. The temperature, pulse and respirations ranged downward, roentgen-ray examination showed a continuous diminution in the size of the abscess. At the end of two weeks temperature, pulse and respiration were normal. Contraction of the pulmonary cavity followed and at the end of two months cicatrization was complete.

Comment: The prompt result in this case showed the great advantage of the specular use of the bronchoscope in clearing away

obstruction to drainage and the advantage of frequent, even hourly, aspiration of acute pulmonary abscess by means of a soft rubber catheter used by the nurses.

The following is a good example of catheter aspiration in a case of acute post-tonsillectomic pulmonary abscess:

CASE 6. A boy, aged six years, was referred to us for the treatment of a chronic laryngeal stenosis following acute streptococcic laryngotracheobronchitis. Tracheotomy had been done for acute laryngeal edema and there was a secondary perichondritis. Our first examination showed besides a total laryngeal atresia, enormously hypertrophied faucial and lingual tonsils, with septic processes in the crypts. In our opinion it is inadvisable to begin treatment of a chronic laryngeal stenosis with such septic foci in the lymphoid tissue; and this seemed especially important in this case because of the streptococcic susceptibility.

The child was sent back to the referring laryngologist with the suggestion that the lymphoid septic foci be eradicated. This he did in the most skilful manner; but five days after operation the child became acutely ill, expectorated half a cupful of bloody, foul pus. The temperature, septic in type, ranged to 105° F.; pulse 110 to 130; respiration around 50. Roentgen-ray examination showed a shadow about the size of a lemon in the right lower lobe. Two days later the abscess had increased one third in size, but no fluid level was visible. The boy was then sent in to us in an ambulance. Bronchoscopy revealed a right stem bronchus closed with foul clots of blood and pus. The bronchus was cleared with forceps and aspirator. A copious flow of foul pus appeared in the bronchus and was aspirated. The superjacent pus showed a variety of saprophytes and pyogenic organisms. The residual pus aspirated showed almost pure culture of streptococcus hemolyticus. Roentgen-ray examination then demonstrated a very low fluid level. Catheter aspirations through the tracheotomic cannula were done by the nurse every half hour while the child was awake and as often as indicated by the breathing sounds during sleep. The result was prompt. The high point of the temperature steadily ranged downward with the pulse and respirations in ratio. At the end of four weeks the abscess had entirely healed and the tracheobronchial secretions were normal. We then proceeded with the treatment of the chronic laryngeal stenosis.

Comment: Considering the extremely bad condition of the patient, the degree of sepsis, the virulence of the infection, the streptococcic susceptibility, rapidly spreading necrosing pneumonitis, there is good ground for belief that without bronchoscopic reestablishment of drainage and the almost constant catheter aspirations this child would not have survived. This conclusion is supported by a number of similar cases observed at our clinic.

It might be added here that our observations elsewhere recorded,⁷ in cases of post-tonsillectomic pulmonary abscess have been convincingly supported by subsequent experience. These observations are as follows: Post-tonsillectomic abscess presents certain peculiar features: 1, sudden onset; 2, putrid and purulent from

the beginning; 3, early cavitation; 4, hematogenous or lymphogenous infection; 5, efficiency of treatment by bronchoscopic aspiration when supplementary to general medical care and management. In the case just cited we have added an instance of the efficiency of catheter aspiration.

CONCLUSIONS

1. The relation of the bronchoscope to pulmonary abscess is that of a bronchial speculum. Its services to internal medicine and thoracic surgery are parallel to those of the vaginal speculum in pelvic disease. With either form of speculum there may be found: (a) conditions requiring only medical care and management; (b) conditions to be treated through the speculum as supplementary to medical care and management; (c) conditions requiring external surgery. But in no case does the gynecologist feel that he has made a complete examination without the use of the vaginal speculum. We may be biased but we feel the same may be said of the bronchial speculum.

2. In cases of pulmonary abscess the restoration and maintenance of proper drainage of the tracheobronchial tree are important whether operative external drainage be established or not.

3. In all cases of pulmonary abscess in which external drainage is contraindicated or postponed, bronchoscopic supervision and maintenance of tracheobronchial drainage are indicated.

4. Catheter aspiration of pulmonary abscess by the nurse, every few minutes or every few hours, as indicated, is an invaluable curative measure in all patients wearing a tracheotomy cannula. The results are so good in such cases as to justify in each case of pulmonary abscess at least consideration of the advisability of tracheotomy to facilitate very frequent aspiration by the nurse.

5. It cannot be too strongly emphasized that tracheobronchial aspiration of pulmonary abscess does not require insertion of the aspirating tube into the abscess cavity. All that is necessary is to clear away obstruction and then aspirate the pus as it is forced into the larger bronchi by the repeated tussive squeeze.⁵

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A REVIEW OF THE SURGICAL TREATMENT OF PRURITUS ANI

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THERE is probably no other anorectal problem that causes more concern to the proctologist than pruritus ani. Itching is usually considered as the private domain of the dermatologist, but in the case of pruritus ani it becomes a proctologic problem and often a neurologic or medical problem. As is pointed out by Lord Horder, all the world itches, but for different reasons in different persons.

The factors that cause the pathologic state of itching around the anus are exceedingly numerous and problematical, and may be grouped as constitutional, local, and those of an unknown origin.

The constitutional causes are: colitis, diabetes, nutritional deficiencies, dietary disturbances, reflex from urogenital diseases, Hodgkin's, uremia, leukemia, jaundice, gout, etc.

The local causes are: lack of cleanliness, excessive growth of hair, excessive perspiration, infection (bacterial, parasitic, or fungus), abnormal eversion of the anus, skin tags, chronic fissure, discharging sinus, herpes, condylomas, leakage of mucus caused by prolapse through the external sphincter of internal hemorrhoids, rectal polyp, hypertrophied papillae, or other conditions that brings the rectal mucosa outside the anus.

From a therapeutic standpoint pruritus ani may be classified into three groups. First, the very trifling pruritus that accompanies some local lesion, constitutional condition or dietary disturbance will be cured by the cure of the local lesion, constitutional condition or correction of the dietary disturbance. This group represents about 75 to 80 per cent of the cases.

Second, those cases of chronic idiopathic pruritus which occur in the absence of any discoverable etiologic factor or local lesion other than discoloration and fibrosis of the involved area. The treatment in this group is directed solely to the pruritus and consists of anti-pruritic medications. If this does not relieve the itching and it becomes intolerable, the destruction of the nerve supply to the involved area is indicated.

Third, the chronic type of case where there is a primary etiologic factor or idiopathic in origin, and the pruritus has become obstinate and followed by or associated with local lesions which have become secondary etiologic factors. In this group the treatment

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should be directed towards: the removal of the primary cause; the surgical removal of the complicating local lesions to correct the secondary etiologic factor; and the destruction of the sensory nerve filaments supplying the involved area for the relief of the itching.

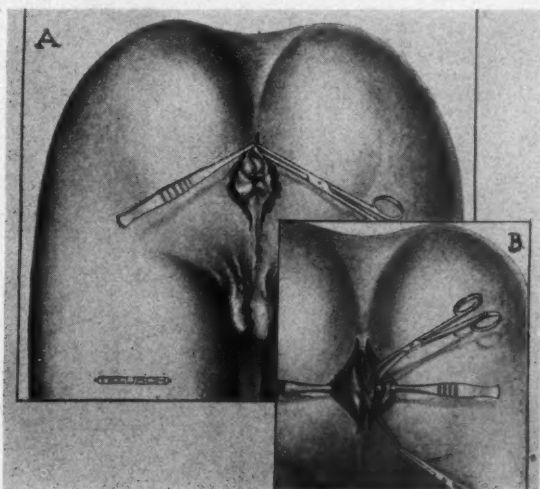


Fig. 1. The Ball operation. Note that the undercutting goes around the anal canal.

The injection of so called prolonged local anesthetic agents is transient in effort, lasting for a few hours to several days, is of little value as the sensory nerves quickly resume their function after the disappearance of the agent's anesthetic affect. The most effective treatment we can offer at present in obstinate cases besides the surgical removal of the local complicating lesions is the destruction of the sensory nerves to the involved area by alcohol injection or surgery so that the patient may have immediate relief of the itching; if not permanently, at least until regeneration of the nerves occur. The alcohol injection has the advantage that the treatment may be repeated as often as is necessary.

The rationale of the surgical treatment of pruritus ani is based on: First, the primary etiologic factor when determined. Second, the severity and duration of the irritation. Third, the local pathology present.

In the severe intractable cases of one or more years standing, connective tissue infiltration results in fibrosis of the skin and subcutaneous tissue. This fibrosis involves the lymph, blood and nerve supply and frequently results in complicating local pathology, such

as thickened peri-radiating skin folds, hypertrophied anal papillae, cryptitis, blind subcutaneous sinuses leading from anal crypts out under thick skin folds, and chronic lymphocellulitis with a constant moisture of the parts. These conditions act as secondary etiologic factors and increase the chronicity and severity of the conditions.

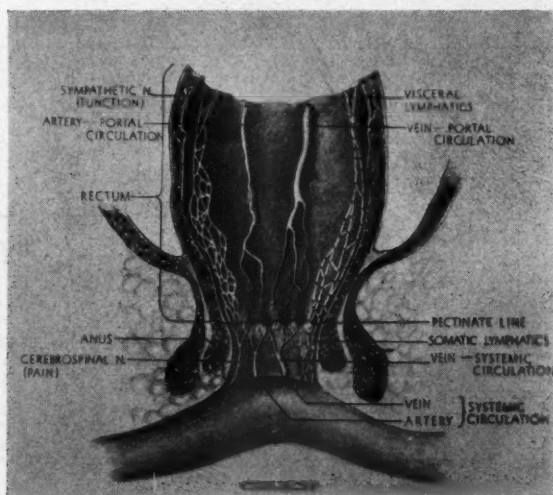


Fig. 2. The anatomy of the parts. The sensory nerves extend up to the pectinate line, and it is therefore necessary to interrupt them up to a little above this.

At this stage the removal of the primary etiologic factor is not sufficient for a cure: It is now necessary to perform whatever surgery is required for drainage and removal of complicating local lesions and to destroy the nerve filaments supplying the sensitive skin of the involved area.

In 1905 the late Sir Charles Ball devised the following operation cutting all the nerves to the involved area.

"A curved incision is made (Fig. 1) on each side of the affected area, enclosing the entire ellipse with the exception of a narrow neck in front and behind. These incisions are carried down to the sphincter muscle, and the flaps raised by careful dissection . . . around its anal margin, and up the anal canal to above the mucocutaneous junction, the dissection extending around the entire circumference, all connections with the subjacent tissues being divided. The pedicles in front and behind are now under-cut to a point well beyond the area of irritation, and the outer concave edges of the incision are also undercut to a distance of at least

one-fourth inch free of the involved skin all around . . . The immediate results of this operation is to render the entire ellipse included between the incision, the pedicles and the outer edges as far as they have been undercut, superficially anesthetic and the itching is at once relieved."



Fig. 3. Krouse's incisions for pruritus ani.

This operation is based on the following anatomic facts: 1. That itching occurs only in areas supplied by sensory nerves. 2. That the sensory nerves supply the anal canal as far as the pectinate line: above the pectinate line it is supplied by the autonomic nervous system (Fig. 2). To make sure that all the sensory nerves coming into the involved area are cut, the dissection of the cuff is carried up the anal canal above the mucocutaneous junction. It cuts the lymphatic channels and blood vessels which drain downward from the pectinate line. It also blocks or lifts up in the flap the anal crypts and any subcutaneous sinuses that may lead from the crypts.

This operation is still in favor by some: probably its strongest advocate is Lockhart-Mummery. It has the following disadvantages: Extensive sloughing of the flaps may occur. Large blood clots frequently form under the flaps followed by infection and massive scar tissue. The fibrous tissue formed in the healing from the extensive undercutting and infection and sloughing is sufficient

in many cases to prevent the return of the normal sensation which is so essential in the control of defecation. Sometimes even stricture or partial incontinence results. The Ball operation does not provide for the correction of other complicating lesions at the same time. The failures and postoperative complications have been sufficient



Fig. 4. Buie's method of local infiltration of the involved area with 40 per cent alcohol.

to cause many modifications. None of which includes the anal canal up to the pectinate line and all are disappointing in results, thus:

L. J. Krouse (transactions of the American Proctologic Society, 1909) makes six or eight linear incisions through the skin into the subcutaneous tissues. These linear incisions begin at a point outside of the zone of irritation and follow the course of the radii of a circle, the center of which is the anal canal (Fig. 3). The skin between the incisions in the infected area is then undercut. The advantage claimed for this operation is better blood supply to the flaps. However, not all the sensory nerves are cut in this operation: Sloughing, bridging, infection, and scar tissue are common sequelae; and results have been disappointing.

Lynch under local anesthesia makes a curved incision $\frac{1}{2}$ inch long, just through the skin $1\frac{1}{4}$ inch from the anus. Through this incision by blunt dissection with scissors curved on the flat, subcutaneous dissection is carried to the anus medially and to the

raphes anteriorly and posteriorly. When completed, there is an area of skin extending from the anterior raphe to the posterior commissure in a radius of $1\frac{1}{2}$ inches of the anus, that has been deprived of its sensory nerves. The claims for this operation are that it is performed under local anesthesia and does not confine the patient;

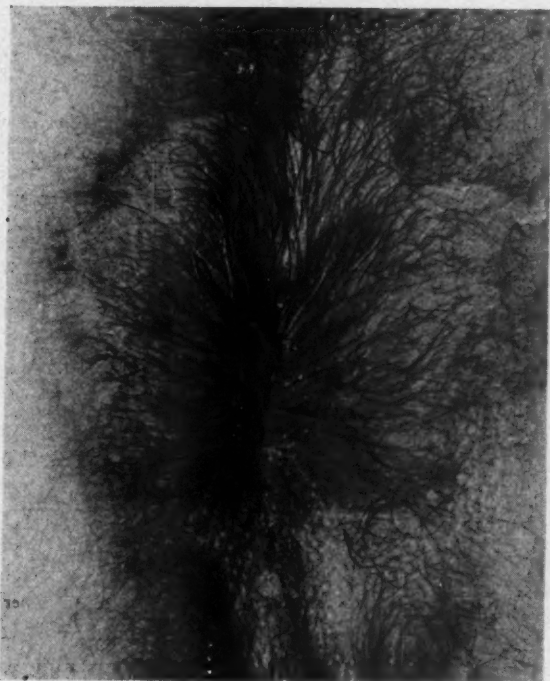


Fig. 5. The chronic uncomplicated type of pruritus ani. The skin is dry, smooth, thickened, and discolored.

there is a minimum amount of scar formation and therefore less probability of stricture, and the blood supply to the operated area is so little disturbed that the danger of sloughing is nil. This operation, however, does not extend the dissection up and around the anal canal to the mucocutaneous junction, and thus does not interrupt all the involved sensory nerve filaments. Infection frequently occurs which may confine the patient several days and failure to relieve the pruritus is common.

Cauterization of the local parts covering the diseased area has been used. This treatment requires a general anesthetic as the burning is deep and extensive; it is followed by much scar tissue deformity and often stricture. Convalescence is long, and the

results obtained are not always satisfactory. It has little, if any, place in the treatment of pruritus.

In 1916 H. B. Stone introduced the method of blocking the sensory nerve filaments by the injection of 95 per cent alcohol subcutaneously. "Only two to four drops are injected at each puncture



Fig. 6. Chronic pruritus ani with associated local lesions. Note the thickening of the peri-anal radiating skin folds, discoloration, and moisture.

and the punctures are spaced about $\frac{1}{4}$ inch apart and are stippled over the entire area involved. The injections are carried up to about $\frac{1}{4}$ inch of the anal margin but are not made within the canal itself." Stone admitted that the procedure "is not as a rule permanent in results, and in this regard it is not different from other procedures."

Many other solutions have been used and various modifications have been introduced. Buie advocates infiltration of the subcutaneous tissues of the involved area with 40 per cent alcohol as with a local anesthetic (Fig. 4). He admits that sloughing occurs in 50 per cent of cases and states "some sloughing is not undesirable." This is not in keeping with general opinion.

The procedures so far described, however, made no provisions for choice or combination of methods in the different types of cases. I like to divide the chronic obstinate cases into two groups according to the local conditions: 1. Pruritus without associated local lesions. 2. Pruritus with associated local lesions.



Fig. 7. Another example of the chronic pruritus with local associated lesions. In addition, note the fissure-in-ano anteriorly, the scar tissue in anterior raphe and the pilonidal sinus.

CHRONIC PRURITUS WITHOUT ASSOCIATED LOCAL LESIONS

When the perianal skin is dry, smooth, discolored and thickened, and the fibrosis is sufficient to cause changes in the nerve endings with no other local lesions present as shown in this case (Fig. 5) the injection of alcohol to interrupt the sensory nerve filaments is the treatment of choice.

When the primary etiologic factor is not removed, recurrence is to be expected as soon as the nerve filaments regenerate, whether interrupted by injection or cutting, but the itching can be controlled by injections repeated at such intervals as is necessary.

CHRONIC PRURITUS WITH ASSOCIATED LOCAL LESIONS

When there is marked lymphocellulitis causing moisture and discoloration of the parts, thickening of the perianal radiating skin folds, blind subcutaneous sinuses leading from the anal crypts downward under the thickened folds, (Fig 6 and 7) hypertrophied papillae or other local lesions, (Fig. 8) in addition to the inter-

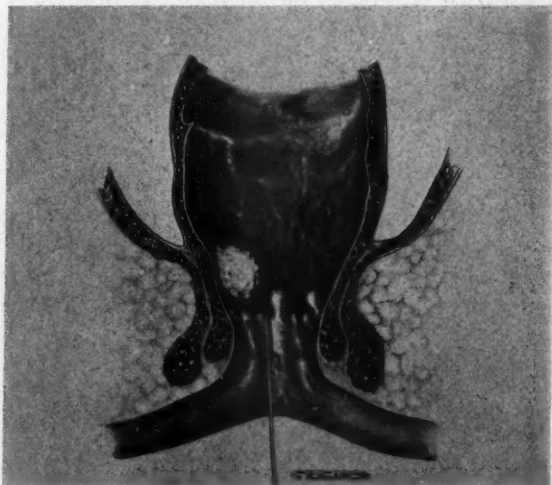


Fig. 8. Diagrammatic sketch showing common local lesions associated with pruritus ani, thickened skin fold, blind subcutaneous sinus leading from the anal crypts with a crypt-hook in the sinus, hypertrophied papillae, and internal hemorrhoids.

ruption of the sensory nerve filaments, it is necessary to clear up the associated lesions because they act as secondary etiologic factors. In such cases therefore the best results can only be secured by the destruction of the nerves to the involved area and the surgical removal of the local lesions or "clearing up of the bog". To meet this need, in 1931 I technically refined Stone's method of alcohol injection and combined it with operation.

AUTHOR'S TECHNIC OF COMBINED INJECTION AND OPERATION

Twelve hours before operation plain water enemas are repeated until the water returns clear so as to render the rectum empty, and the mucous membrane clean and dry as possible at the time of operation. The skin is shaved and cleansed with an antiseptic solution that does not stain the skin.

On the table the patient is placed in a jack-knife position. The skin is again cleansed with a non-staining antiseptic. Through a

proctoscope the mucous membrane is swabbed with mercurochrome (2 to 4 per cent) or metaphen (1:2500), and dried with swabs.

The buttocks are now separated so as to stretch the perianal skin. With a long, sharp, straight, spear-pointed skin needle, lines are scratched from behind forward at intervals of $\frac{1}{4}$ inch over the

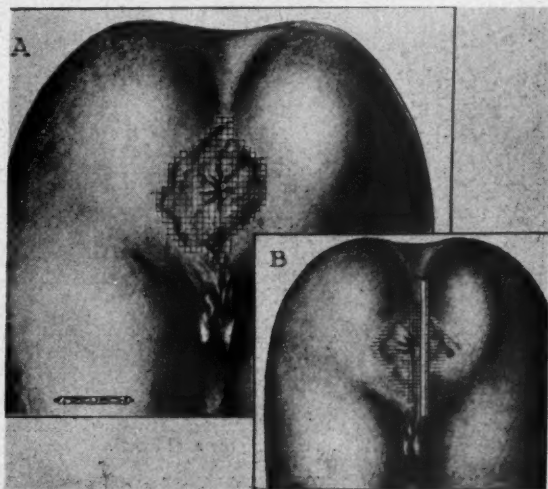


Fig. 9. Method of scratching the perianal skin in squares of $\frac{1}{4}$ inch preparatory to the injection of alcohol.

involved area. Then similar lines are scratched at right angles to the first ones (Fig. 9). The involved area is thus laid off in quarter inch squares. A 2 c.c. tuberculin syringe graduated in minims, with a 27 gage needle not over $\frac{1}{2}$ inch long, is filled with 95 per cent alcohol. The needle is plunged vertically just through the skin at each intersection of the lines and 2 minims of alcohol is injected into the subcutaneous tissue (Fig. 10). The entire area of irritation including the anal canal up to the pectinate line is injected in this way.

(In cases without associated local lesion, it is unnecessary to do anything further.)

Five or ten minutes is allowed to elapse in order to permit the alcohol to diffuse into the subcutaneous tissues. Then, with a crypt-hook inserted into the subcutaneous sinus leading from the anal crypt, the thickened skin fold is lifted up (Fig. 11). With scissors curved on the flat the skin fold and the crypt-hook are excised from the outer margin of the irritated area up into the anal canal including the crypt, thus unroofing the sinus and affording surgical drainage (Fig. 12). Other folds are treated in like manner until all have

been removed (Fig. 13). Hemorrhage is controlled, but in many cases no sutures or ligature are required.

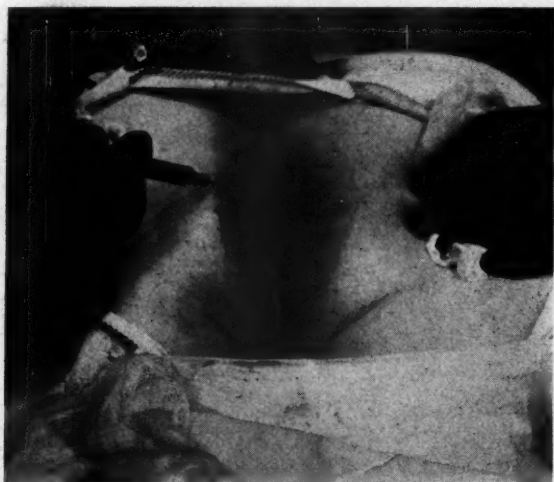


Fig. 10. Two minims of alcohol are being injected subcutaneously at the intersection of the lines over the entire area including the anal canal.

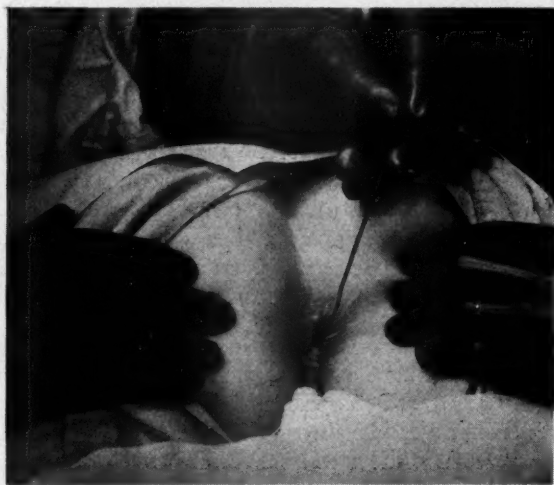


Fig. 11. Crypt-hook inserted into the subcutaneous sinus leading from the anal crypt and lifted up.

A small wick of nupercaine gauze is inserted into the rectum. The buttocks are released and the edges of the wounds fall together. A rectal pad T binder is applied.

There is an immediate feeling of numbness and dryness in the injected area, and the itching is relieved. There is little post-operative pain, so opiates are rarely required.

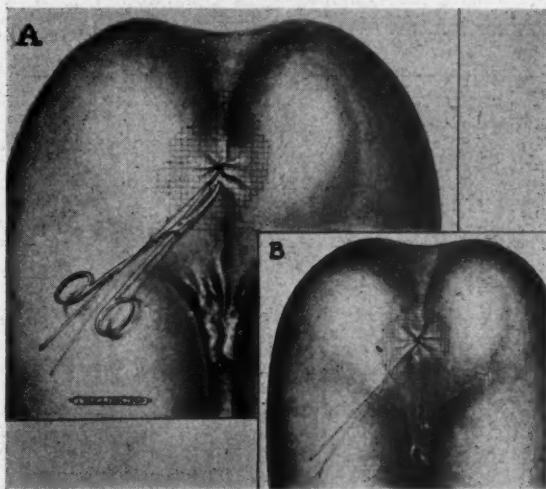


Fig. 12. Removal of the skin fold and crypt-hook with scissors curved on the flat so as to unroof the sinus.



Fig. 13. Completed operation. The scratched lines are still visible.

The gauze is removed on the second day and hot sitz baths or boric fomentations are begun twice a day and continued until the

wounds are healed. This requires from 10 to 21 days, though the patient is usually allowed bathroom privileges on the fourth day, and leaves the hospital on the fifth. Digital examination is made every third day to prevent bridging or constriction until the wounds heal by granulation.



Fig. 14. A case of chronic pruritus ani associated with local lesion before operation.

DISCUSSION

Acting on Ball's principle of denervation of the involved area, Stone introduced the subcutaneous injection of alcohol for the relief of pruritus ani. He did not include the anus, although Ball had already emphasized the importance of complete interruption of the sensory nerves of the anus. I have extended Stone's procedure to include the anus, and have described a systematic method of placing the punctures. A short needle makes it easier to measure the depth of the injection: intracutaneous injection of alcohol will cause a slough. A fine needle prevents backflow: as only two minims are used in each injection, a small backflow will make a great difference in the results.

In the past insufficient emphasis seems to have been placed on the correction of other associated local lesions, which become secondary etiologic factors. Therefore for the treatment of such cases of pruritus ani I devised a combined method of alcohol injection for the denervation with surgical removal of local lesions.



Fig. 15. The same case as Fig. 14 fourteen days after operation. There has been a slight slough posteriorly from alcohol given intradermally.

In this technic, all tissue that is clamped is excised. Few ligatures and no sutures are required. Infection and sloughing are rare and so slight that they are of little importance. Free drainage, with the least disfigurement, and no interference with physiologic defecation are obtained. There is little postoperative discomfort and hospitalization is short.

Seventy-one patients with chronic intractable pruritus with local associated lesions have been treated by the combined method. Of those that were operated on more than a year ago (some as long as 9 years), more than 80 per cent have been completely relieved. In the recurrences peri-radiating skin folds, blind subcutaneous sinuses, hypertrophied papillae, dampness of the skin or other local

lesions have rarely been observed; palliative medicinal measures or further injections of alcohol, Gabriel's solution, or benacol have usually controlled the itching.

SUMMARY

1. When the primary etiologic factor can be removed in a case of pruritus ani of short standing, a permanent cure is to be expected.
2. In chronic, intractable cases the injection of alcohol into the involved area, which includes the anal canal up to the pectinate line, will relieve the itching from two to eighteen months. When other local lesions are associated with the chronic obstinate pruritus, they often become secondary etiologic factors and it is essential to correct them.
3. A detailed technic is described for the combined injection of alcohol and operation.
4. This combined method has been successful in more than 80 per cent of cases of chronic intractable pruritus ani with associated local lesions.

GASTRO-ENTEROSTOMY VS. POLYA OPERATION IN DUODENAL ULCER

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PEPTIC ulcer of the duodenum, although much discussed, is still being treated by many methods with various results. As with any disease it is highly important to evaluate the normal and pathologic physiology behind the disease, and only when this is understood can we formulate an appropriate plan of attack.

To understand the causative factor or the altered physiology associated with peptic ulcer let us briefly review the hypothesis and known facts. We know that there are successive periods of activity and quiescence. The factor responsible for these ulcerations must either vary in potency from time to time or at certain times must be counteracted by the natural resistance of the tissues. It has been amply demonstrated by physiologists that the tissues have increased vulnerability to gastric juice of high acid-pepsin value. The gastro-duodenal tissue has a mechanism to protect it from high acid. If, however, the increased acidity is continued for a long period this defense will eventually break down and cell destruction takes place.

The defense mechanism of these cells is particularly true in the duodenum, where not only the alkaline blood in the mucosa is a protection but the alkaline mucoid secretion is suffused over the surface by the glands of Brunner, as demonstrated by Florey and Harding. The organs which pour such secretions into the duodenum as bile and pancreatic juice also aid in neutralization as shown by Mann and Williamson, when by sidetracking these secretions they were able to demonstrate the development of duodenal ulcer in 50 per cent of their animals. Still another line of defense is the hormone, enterogastrone, secreted by the intestinal wall. Thus we must believe that high acidity with weakened tissue defense certainly can account for cell destruction and ulceration.

The traumatic origin of an ulcer is known. Rosenow suggested that septic emboli, the result of focal infections, may settle as small "nests" in the depths of the gastroduodenal tissue, locally destroying the resistance and tending to ulcer formation.

Since the acid-pepsin values are elevated during excitement and mental tension it is easy to conceive that the persons who are subjected to nervous disturbances might be potential ulcer patients. This was recognized by Hurst and Stewart in their description of the "hypersthenic gastric diathesis."

Read before the North Carolina Academy of Surgery, in Greensboro, N. C., Feb. 2, 1937, and the Sectional Meeting of the American College of Surgeons, in Atlanta, Feb. 3 and 4, 1937.

We must therefore appreciate that physiologically the high acid-pepsin value is the pathologic criminal we wish to destroy in curing the patient with peptic ulcer.

The next question presenting itself is: what regulates the acid production of the gastric glands? Recent work seems to point out that the acid-regulating stimulus is located in the pars pylorica and lower third of the stomach. There may be direct stimulation of the part but certainly a blood borne stimulus has been noted in dogs where a gastric pouch entirely separate from the stomach will produce acid when food is introduced into the stomach.

With this brief review of the causative factors of peptic ulcer let us now approach the patient with a duodenal ulcer. The first consideration is whether or not the patient should be treated medically or surgically. Medical treatment has much in its favor and should always be the course in the bleeding ulcer. The one danger of medical treatment is that it may be continued too long without results. I think, as do many others, that we may temporize with a duodenal ulcer with a certain degree of safety, but not so with ulcers of the pars pylorica of the stomach. In these latter cases I believe medical treatment for six weeks with an x-ray check at the end of this time is indicated. If improvement is shown, medical treatment should be continued; if not, surgery is indicated. The duodenal ulcer which is causing obstruction, penetrating or rebelling against medical treatment should be operated upon. When surgery is indicated in a case of duodenal ulcer, what procedure should be done?

We all know that some ulcer patients have a normal or low acidity while in others the acidity is increased. These factors are of the utmost importance in making our decision as to the type of operation. In discussing the procedures I will present representative cases from our series at the Lankenau Hospital.

Before presenting these cases I would like briefly to state a few facts concerning gastro-enterostomy. Of the first result anticipated from this operation, namely, an increased rate of emptying, there seems to be no question. The stoma acts similarly to the pylorus, allowing the chyme to escape at certain intervals, corresponding to the peristaltic movements of the stomach and intestine attached. When the pylorus is not obstructed but spastic this operation relieves the spasm and the pylorus may function also. This has been seen under the fluoroscope. Gastro-enterostomy does provide an unobstructed passage for the food, either directly or indirectly by relieving the pylorospasm.

The second result hoped for, reduction of the acidity from back-flow of intestinal juices, is not so happily achieved. There seems

little doubt that regurgitation does take place after gastro-enterostomy. In 30 of our gastro-enterostomy cases only one apparently did not regurgitate, and this one showed a deformed and inadequate stoma. Even the ingestion of water alone caused regurgitation in 50 per cent of our series. Now since regurgitation after gastro-enterostomy seems to be the rule, does it actually reduce the acidity to normal, when hyperacidity was present before operation? Does it inhibit the irritating action of pepsin on the diseased mucosa?

Enderlen states that it will take an equal quantity of intestinal juices to reduce the acidity to one-quarter of its value. It is believed that nothing more, then, than an automatic "test tube" neutralization of the gastric contents occurs, and the same principle may apply here as in the alkaline medication; namely, that this neutralization may ultimately be the cause of an increased acid production. According to Reimann, pepsin remains active until bile enters to such an extent that the acidity is reduced below "normal." Thus unless the acidity is reduced to within so-called normal limits pepsin still carries on its digestive action and the higher the acidity the more active the pepsin digestion. We may infer, therefore, that the greatest relief following pyloroplasty and gastro-enterostomy comes from the restoration of the continuity of the gastroduodenal canal, and that the subsequent good results of neutralization have been greatly overestimated.

Gastro-enterostomy has its place in our surgical armamentarium to combat ulcer but I believe it is limited. We have all seen recurrent ulcer, marginal ulcer, gastro-colic-jejunal fistulae after gastro-enterostomy. Gastro-enterostomy will not relieve gastric acidity but shunts the circuit and protects against ulcer irritation. I believe that gastro-enterostomy is the operation of choice in duodenal ulcer with normal or low acidity, and would like to present two cases briefly to illustrate the point in question.

A man of 41, who had had symptoms over a period of three years, was operated on in 1932 at a New Jersey hospital for duodenal ulcer and gastro-enterostomy performed. The symptoms were not relieved and he entered Lankenau Hospital with typical symptoms of marginal ulcer with high acidity. In December, 1934, the gastro-enterostomy was released and resection of the jejunum containing the ulcer and an end-to-end anastomosis of the jejunal ends were performed. Again his symptoms and high acidity were not relieved, and he was re-operated on in October, 1935, when a modified type of Finney pyloroplasty was done. His symptoms still continue to the present time and the acidity remains high. This patient in my opinion will never be well until he has a gastric resection to reduce his acidity.

In contrast to the preceding case is that of a man 53 years of age, with symptoms of twelve years' duration. Diagnosis of duodenal ulcer with low

acidity was made. In February, 1935, a posterior gastro-jejunostomy was done. The patient at follow-up shows low acidity, complete relief of symptoms and is eating "anything."

These cases are not alone in emphasizing this point but are two typical results, and make one stop and think. Numerous other cases presenting these pictures have led us to the conclusion that gastro-jejunostomy is the operation of choice for the cases with low acid.

What then should be the treatment for the high acid ulcer cases? I believe a gastric resection of the Polya type is definitely indicated.

A case in point is a man, aged 47, with symptoms of five years' duration, who had a duodenal ulcer with high acidity. In 1931 a duodenal ulcer was excised, and the abdomen was opened again in 1933 when adhesions were found but no ulcer was present. His symptoms continued with high acidity. A third operation was performed in January, 1936, when an ulcer was found in the duodenum and a Polya resection was done. One year later he had no gastric complaints and had gained weight. The acidity is now low.

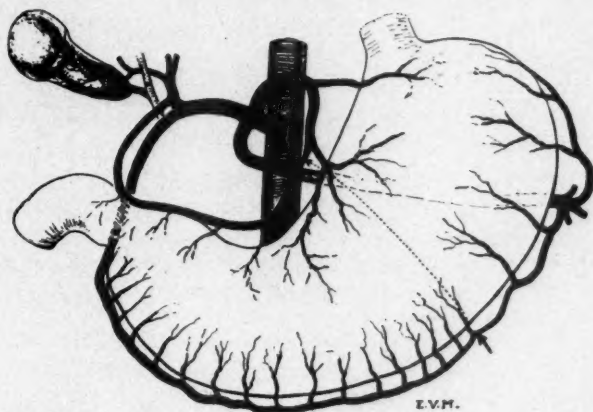
Lorenz and Schur noted that removal of the antrum pylori decreases the production of hydrochloric acid and therefore lessens the probabilities of recurrent ulcer. Stein records a progressive diminution of gastric juice leading to achylia. Crohn found after resection of the pyloric antrum a resultant anacidity, even though the remainder of the stomach contained anatomically perfect secreting cells. He believed that the portion removed contained nerve centers for the stimulation of hydrochloric acid production. So much for the rationale of the gastric resection.

In the hands of a man experienced in gastric surgery the mortality is no more startling than with gastro-enterostomy. Then again the patient is cured with one operation rather than being subjected first to a gastro-enterostomy and later to a resection when he has had a recurrence. I am now speaking of the high acid ulcer case. One might say that marginal ulcer has occurred after resection. That is true, but in recent years the technic has been so improved that the percentage of recurrence is small. Friedemann in his series of 2,250 gastric resections, after a careful follow-up, found a recurrence of 4 per cent in his earlier cases but only 0.5 per cent after he had performed a more radical type of operation. This figure of 0.5 per cent is indeed almost the utopia in treatment.

Thus the secret of the results of resection seems to be dependent on the technic used. I believe that two things are the cause of poor results in gastric resections: First, not enough of the stomach is removed and therefore higher resections should be done; and second, the pars pylorica should have its mucous membrane removed if it is left behind. It has been observed by Spath, Friedemann and others that recurrence after resection was found at subsequent

operation to be due to the remaining pars pylorica, and that after its removal the acid became low and there was no recurrence.

I would like to suggest three factors in gastric resection. *First*, in deciding where to section the proximal end of the stomach one should be sure to go up high enough. I take a line beginning at a point on the lesser curvature at about the junction of the proximal and middle third, which is about the point where the left gastric



Line indicating point where stomach should be resected to get above the antrum.

artery already anastomosed with the right gastric artery comes into the lesser curvature. One can see at this point the dividing of the main vessel into two or three terminal branches which supply the lesser curvature. A line bisecting the stomach is carried to a point on the greater curvature where the right and left gastro-epiploic arteries anastomose. This can be found easily since the branches of the right gastro-epiploic are numerous and close together while the left gastro-epiploic branches are not numerous. This line between these points is well above the antrum of the stomach.

The next suggestion is the modification of the original Polya used by Muller. He divides the stomach at the above line immediately after ligating the vessels on the lesser and greater curvatures, in contrast to Polya sectioning at the duodenum and working up. The advantage of Muller's method is that by turning the distal segment anteriorly and medially you have good exposure when working around the common duct and the adjacent vessels.

The third suggestion is that one should always remove the pars pylorica. In some cases that is impossible. Several weeks ago I did one in which the ulcer had infiltrated the head of the pancreas and

could not be mobilized for resection. In this type it is exceedingly important to remove the mucous membrane of the pars pylorica. The best technic I know is the one devised by Andreas Plenk. He sections the distal end of the stomach between clamps. Then just distal to the lower clamp he makes a circular incision around the pylorus incising the serosa and muscularis. These two layers are stripped down leaving the mucous membrane. This mucous membrane is then removed and the stump sewed over.

As to the mortality of gastric resection today with improved technic it should not run higher than 5 or 6 per cent. There are much better figures given. For example, Konnecke reports 468 resections with a 1.9 per cent mortality and von Haberer reports 100 consecutive resections with no deaths.

In conclusion, I would like to emphasize again that in duodenal ulcer with low acidity a gastro-enterostomy is the operation of choice, while in duodenal ulcer with high acidity a radical gastric resection, including the pars pylorica or at least its mucous membrane, is the only surgical treatment that will approach the utopia of a permanent cure.

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THE ENDOCRINE BASIS OF GYNECOLOGICAL ORGANOTHERAPY

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THE concept of ovarian endocrine function which prevailed in the early years of the present century was very simple, predicated merely a single internal secretion which in some way was responsible for menstruation. With the discovery by Fraenkel (1903) of the endocrine activity of the corpus luteum, there were many who assumed that this structure was the sole source of the ovarian secretion. As a matter of fact, it was not until the discovery of the follicular hormone, by Allen and Doisy in 1923, that we could separate the endocrine principle of the ovary rather sharply into two separate hormones, one produced by the growing follicle, the other by the corpus luteum. This new knowledge fitted in very smoothly with what had in the meantime been learned as to the histologic sequence of events during the cycle.

Beginning just after a menstrual period, a considerable group of follicles begins to mature, and incidentally to produce increasing amounts of the follicle hormone, which unfortunately is known by various names; viz., estrone, estrin, theelin, folliculin, menformon, etc. Only one of this group of follicles as a rule reaches full maturity and ovulates, usually at about the midinterval between periods. The other follicles are blighted at various phases through the process known as atresia folliculi.

After ovulation, the collapsed follicle begins a second or corpus luteum phase of development, rising like a phoenix from the ruins of the follicle and progressing to an acme which is reached probably a day or two before the onset of the next period. During its growth it continues to secrete estrin, but, in addition, it produces a second and more characteristic corpus luteum hormone, known in this country usually as progesterone.

What effects are exerted by these two hormones upon the uterus? Estrin may be looked upon as a growth hormone possessing a highly selective effect upon genital mucous membranes. The endometrium therefore undergoes a steadily increasing developmental advance from the end of one period to the beginning of the next. In addition, estrin has a less conspicuous developmental effect upon the mus-

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culature, and is apparently responsible for the normal rhythmic contractility of the latter.

Progesterone, on the other hand, becomes operative only after ovulation, and is responsible for the secretory activity of the gland epithelium which becomes increasingly apparent after the formation of the corpus luteum, and which is apparently essential to the implantation of the egg in the event of this having been fertilized. It likewise exerts an inhibitory effect upon the rhythmic contractility of the uterus.

From what little has already been said, it is clear that no amount of estrin is in itself capable of producing in the uterus the same changes which characterize the normal cycle. Both ovarian hormones, acting in sequence, are essential for this. This obviously has a bearing on the treatment of amenorrhea. A second point which should be stressed is that when the ovarian hormones are used in the treatment of amenorrhea, their effect is purely substitutional, for it is well established that they have no stimulating effect on the ovaries; i. e., they are not capable of starting the ovarian machinery.

While ovulation occurs most often between the tenth and seventeenth days of the cycle, all sorts of vagaries may be noted. At times, indeed, ovulation does not occur at all, but the unruptured follicle undergoes dehiscence without the formation of a corpus luteum. Even so, an apparently normal menstrual period may appear at about the right time, for the bleeding following withdrawal of the follicle hormone characteristically does not occur⁶ for a good many days. Women with such a non-ovulating or anovulatory cycle must of necessity be sterile, for they do not produce ova. While this is relatively infrequent, it does explain a certain proportion of otherwise unexplainable instances of sterility. The occurrence or non-occurrence of ovulation in any cycle can be readily determined by securing for histologic examination portions of uterine mucosa shortly before the expected date of menstruation.

So far I have spoken only of ovarian hormones, but these are only links in a far-flung endocrine chain involving also other ductless glands than the gonads. The most important of these is the anterior pituitary, which completely governs the endocrine activity of the ovary. A discussion of the function of this most important of endocrine glands, dominating not only the ovary but also the thyroid and the adrenal cortex, is a long story in itself, so that only one or two points relating to our present discussion can be mentioned. The domination of the pituitary over the ovary is dependent upon two

sex hormones, one responsible for maturation of follicles and the motivation of estrin, the other responsible for luteinization and the motivation of progesterone. These two gonadotropic hormones are therefore spoken of as the follicle-ripening hormone and the luteinizing hormone. The best evidence now indicates that they are really separate hormones and do not merely represent different manifestations of the same principle, as some still believe.

There is still another pair of hormone principles to be considered, in addition to the two ovarian and the two pituitary factors. With the occurrence of pregnancy, there is a sudden increase in pituitary activity, with the appearance in the urine of certain principles which were formerly thought to be the overflowing pituitary sex hormones themselves. With a few exceptions, investigators now believe that while these pregnancy urine principles are very similar to anterior pituitary principles in many respects, they differ from the real pituitary hormones in others, and that they are probably formed elsewhere than in the pituitary. This certainly seems to be true as regards the luteinizing element, which is apparently formed by living trophoblast at the implantation site. Together the anterior pituitary-like pregnancy urine principles constitute the so-called prolan, upon the presence of which depends the efficacy of the various pregnancy tests. The follicle-ripening fraction is commonly spoken of as prolan-A, the luteinizing as prolan-B.

In addition to the hormones which have been discussed, mention may be made of another hormone principle, emmenin, which Collip has been able to extract from the placenta. It is capable of producing estrus in immature rats, but has no effect on adult animals, either normal or castrated. It is effective when given either orally or parenterally. The placenta, moreover, contains and probably produces both estrin and anterior pituitary-like hormones.

With reference to the hormone mechanism of menstrual bleeding, the evidence of recent years has seemed to indicate that the responsible factor is a withdrawal or sharp drop in the estrin blood level, thus "knocking the props," as it were, from the endometrium which had been built up under hormonal stimulation. It was rather generally accepted that the catabolic phase thus induced in the endometrium is responsible for its desquamation, with the accompanying bleeding, which we call menstruation.

There has always, however, been a minority of investigators who believe that the responsible factor is the withdrawal of the corpus luteum secretion, progesterone. The recent work on the chemical kinship of estrin and progesterone makes this difference of view-

point seem less sharp and less important than formerly, but it is of interest to note that two very authoritative investigators, Engle and Smith, have recently produced evidence to support the minority view that withdrawal of progesterone rather than of estrin is the endocrine factor of prime importance in precipitating the actual bleeding of menstruation.

It would appear, however, that the broad concept of menstrual bleeding as a phenomenon due to endocrine withdrawal remains unchanged. Furthermore, the view that the ovarian hormone drop is induced by a reciprocal inhibiting effect upon anterior pituitary function still seems the most tenable, especially as Clauberg and Breipohl have recently shown that the inhibitory changes produced in the pituitary by progesterone and demonstrable by histologic study are quite similar to those produced by estrin.

In all discussions of the mechanism of menstruation, it is upon the endocrine factors that much the heaviest accent has been laid, first those originating from the ovary, more latterly also those arising in the anterior lobe. Indeed, almost nothing is known of any other cogs in the menstrual machinery, though some must be of great importance. It is of interest, therefore, to note that physiologists are now probing deeper than the anterior hypophysis in the elusive search for the "deus ex machina" of the reproductive cycle. We must now encompass in our discussions of the subject at least a nebulous consideration of the probable roles of the posterior pituitary lobe, the hypothalamus, and the floor of the third ventricle, and already a sexual center, located somewhere in the midbrain, has been postulated.

Perhaps the first intimations that the parahypophyseal portions of the midbrain play a part in the reproductive cycle emanated from the long discussion as to the seat of disturbance in certain abnormalities of the cycle, and especially in the so-called hypopituitary amenorrhea associated with the adiposogenital dystrophy of Fröehlich. This is not the place to review the fluctuations of the discussion throughout many years. Suffice it to say that there now seems to be general acceptance of Smith's convincing demonstration that the metabolic disturbances of this syndrome are of hypothalamic and not of pituitary origin, though the anterior hypophysis is responsible for the sex changes.

The exact nature of the hypophyseocerebral relationship is not known, and certainly there is no widespread acceptance of the view that the mingling of effects is due to an invasion of the hypothalamus by hypophyseal cells. At any rate, we can no longer hew too closely

to the hypophyseal line in the consideration of the metabolic disturbances which are so often associated with amenorrhea. There is some evidence, too, to indicate that an extrahypophyseal factor may be concerned in the frequent transitory weight increase of the normal human cycle. Attention has been recently called to these by Sweeney, as a result of weight studies of 42 normally menstruating women. In 30 per cent of these, he found an increase of 3 or more pounds during the period. My own experience convinces me of the general correctness of Sweeney's observations.

The most outstanding development in the field of reproductive physiology during the past few years has been the recent work on the chemistry of the sex hormones, and especially the demonstration of the close kinship in the molecular structure of the male sex hormone, the follicular hormone and progesterone, as well as the remarkable relationship of all three of these to the well-known sterol group of chemical compounds, to the bile acids, to certain vitamins, and to various carcinogenic substances. When one considers that only a few years have elapsed since the discovery (1927), by Aschheim, that estrin is present in large amounts in urine of pregnancy, and that up to the opening up of this large source, chemical studies of the hormone on any large scale had hardly been possible, one can appreciate the rapidity with which our knowledge has been advanced since then. Within a few years estrin was obtained in crystalline form by Doisy and his coworkers, the crystals being for the first time exhibited by Doisy at the International Congress on Physiology, held at Boston in August of 1929. At about the same time, and quite independently, a similar accomplishment was achieved by Butenandt, whose publication appeared a little before that of the American workers. Still other investigators reported similar results almost immediately afterward, indicating what a hot trail all had been following.

It soon became apparent that not all of these studies had yielded exactly the same substance, but that estrin existed in a variety of forms, so that soon it became necessary to distinguish between ketohydroxyestrin ($C_{18}H_{22}O_2$) and trihydroxyestrin ($C_{18}H_{24}O_3$). The former is the substance isolated by Doisy, and also by Butenandt, while to Marrian is due the credit of isolating the latter. Both occur in the urine of pregnancy, but ketohydroxyestrin is a far more potent physiologic substance than is the trihydroxyestrin. There are various other differences between the two, as regards method of extraction, solubility, and so on, but these need not be discussed here, especially as the present writer makes no pretense to the chemical knowledge necessary to do this intelligently.

As regards the chemistry of the corpus luteum hormone (progesterone), there has been the same intensive pursuit of its structural formula, the pioneers being Allen, Butenandt, and Slotta, Ruschig and Fels. Butenandt gives its chemical formula as $C_{21}H_{30}O_2$, and he, with Westphal and Hohlweg, in April of 1934, described the preparation of a crystalline chemically pure substance with this formula. Here again there are a group of closely related substances to be dealt with.

My purpose in discussing the chemistry of these hormones, however, is to emphasize, first, a fact which may prove to be of great clinical importance, viz., the close structural relation which exists between the two ovarian hormones and between them and the male sex hormone, ankrokinin or androsteron. This is at once evident from the fact that all three of these hormones are built around the same phenanthrene group, composed of three six-membered rings. Phenanthrene itself, rather curiously, is quite inactive, but the various sex hormone derivatives possess various types and degrees of physiologic potency.

Long before these fundamentally important facts had been established, it seemed logical to believe that there must be some very close relationship between estrin and progesterone, for both are products of essentially the same cell. Just as the lutein cell is only a modified granulosa cell, so it seemed that progesterone would prove to be only a modified estrin. This, indeed, is what actually seems to be the case.

Just as surprising as the relation between estrin and progesterone is that which exists between the male and female sex hormones. It has long been known that estrin is at times found in the urine of men, and the male hormone in the urine of women. As a matter of fact, perhaps the most surprising feature of Siebke's recent thorough study of the hormone excretions of women during the menstrual cycle is the constant finding of the male hormone in the urine, though not in the feces. From a quantitative standpoint the amount is not at all negligible, a liter of urine containing an amount of the male hormone worth in Germany 10 R. M., at the present market value of the substance. Indeed, Siebke suggests female urine as a conveniently available source for the production of the hormone. A more striking incongruity is seen in the case of horses, for the urine of both the mare and the stallion is rich in estrin.

While the finding of the male hormone in women might theoretically be explained as due to the secretory activity of the potentially

testicular elements normally present in the region of the rete ovarii in all women, and while this explanation is still favored by some, it is difficult to explain on corresponding histologic grounds the presence of the female hormone in the urine of males. It seems more likely that the reason is to be sought in the recently demonstrated closeness of chemical relation between the male and female principles. Again we see in each the same phenanthrene nucleus, and the molecular formula of the male hormone differs from the female only by a molecule of water and an atom of carbon. Zondek has recently suggested that in both sexes the male hormone is first produced, being converted by dehydration into the female, probably under the influence of the metabolic processes which many consider to be of underlying importance in the matter of sex determination. This explanation would obviously not apply to the paradoxical conditions existing in the equine family above alluded to. It will thus be seen that this newly discovered chemical relation of the male and female hormones is of fundamental importance as regards the questions of sex specificity, sex differentiation, and intersexuality.

Most provocative of all, however, is the fact that certain of the sterol substances are not only estrogenic but also carcinogenic. There are a certain number of circumstantial observations which even before this had suggested some sort of relation between the endocrine organs and cancer, such as the frequent positiveness of the Aschheim-Zondek test in cases of female genital cancer, and the finding of large amounts of estrin in the blood of cancer patients, even when these are males. To these might be added the results of many experimental studies during the past few years, such as those of Murray, Cook and Dodds, Overholser and Allen, Hofbauer, Geschickter, Lewis and Hartman, and Lacassagne. The last named, for example, has reported the production of mammary cancer in three male mice, in a strain in which this disease spontaneously affects only the female, by means of the injection of oily solutions of estrin.

To say, as some are already saying, that cancer is perhaps produced by derivation or deterioration products of the hormones, is certainly unjustified and premature, but, on the other hand, the possibility that the closed door of cancer may sooner or later be unlocked by an endocrine key has been made more real by the chemical studies we have been discussing. On the other hand, it is only fair to state that some investigators, notably Loeb, are considerably less enthusiastic about the possibilities in this field. In his

recent review of the subject, this author states that "while carcinogenic hydrocarbons as well as regenerative processes (irritation) may affect a great variety of tissues, the estrogenic hormones are limited in their action to the tissues, in which they induce growth processes during the normal sexual cycle." In any event, the next few years are sure to be exciting ones to those now pushing forward along this new line of investigation.

SURGICAL TREATMENT OF PAINFUL SYNDROMES OF THE HEAD AND NECK

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THE surgical relief of pain in any part of the body involves more than the dissection and division of nerve tracts in the spinal cord, nerve trunks, and terminal branches of the nerves. Nowhere is this more true than in attempting to relieve pain about the head, face, and neck. One of the chief difficulties is the fact that pain is a purely subjective sensation and may be the result of emotional, psychic, or physical stimulation, or may be caused by trauma. It may also be the result of irritation of the central nervous system or the peripheral nerves.

That the so-called subjective pains are real and important to the patient is one of the stumbling blocks in distinguishing them from the objective type of pain. These inorganic pains are the result of emotional and exhaustion states, hysteria, habit reaction, and inadequate personalities. When an attempt is made to relieve such pain by surgical measures the patient is not only not relieved but the condition is more than likely to be accentuated. It is for this reason that a most careful history and examination of the patient who complains of pain is imperative, because it is only in this manner that an unbiased estimate of the pain can be obtained. During the examination, evidence and information indicative of the type of operation necessary for relief is found or definite contraindication to operation is emphasized.

Pain about the head, face, and neck may be the result of intracranial lesions such as tumors of the brain or other expanding lesions. It also may be caused by intrapharyngeal lesions or lesions of the frontal and ethmoid sinuses, mouth, ear, nose, eyes, neck, scalp, skull, or skin.

The history and examination usually indicate obvious lesions, which can be treated locally and relieved, but the more complicated and obscure pains are often difficult to allocate and are difficult to relieve by surgical measures.

Headache is a symptom and is usually accompanied by other symptoms such as nausea, vomiting, dizziness, or failing of vision, indicating some intracranial lesion. If, however, pain in the head is the only symptom and is not associated with hypertension or other

systemic disorders, then a complete examination, including roentgenograms of the head and cervical vertebrae, and examination of the nasopharynx and eyes, may be necessary to find the trouble. Pain in the head which extends to the face and neck suggests the neuralgia or involvement of the cranial or cervical spinal nerves. The difficult problems of diagnosis and treatment which usually fall to the neurologist and neurosurgeon are of extreme interest to every practitioner of medicine because it is often just as important to know when not to operate as to know when to operate. Minor operations frequently are performed for subjective pains and often are followed by major operations which do not produce relief. The end result is far from satisfactory to the patients and the many physicians to whom they apply for relief.

One of the most prevalent and frequently obscure causes of pain about the head, face, and neck is migraine. Migraine is a relatively common disease characterized by a hereditary tendency, a lifelong course, periodicity of attacks, and no manifest alteration of structure. While the pain usually is diffuse over the cranium, it may be felt in any part of the distribution of the fifth cranial nerve associated with diffuse headache, or it occurs in one small region as an isolated phenomenon. When the pain is felt in one region of the distribution of the fifth cranial nerve, the disease follows the characteristics of migraine, irrespective of situation (neuralgic migraine). As a result of exhaustion, stress and strain, the periodic pain may become constant and continue so. The change from a periodic headache to a localized pain in the jaws or face is not uncommon during the fourth and fifth decades of life. Patients who have migraine are poor subjects for operation. Section of the posterior root of the gasserian ganglion not only fails to relieve the patient but adds to the multitude of unpleasant sensations and the marked nervous exhaustion.

Several operations have been advised and carried out for the relief of migraine headaches, especially the hemicrania of migraine in which the headaches are confined to half of the head. The ligation of the middle meningeal artery intracranially has been advised and carried out with only a minimal amount of relief. Cervicothoracic sympathetic ganglionectomy in selected cases seems to be the most efficient type of treatment. Fortunately, it is possible to select the cases by injection of the stellate and first thoracic sympathetic ganglions. If procaine is injected into these ganglions during a paroxysmal attack and the attack is immediately controlled, cervicothoracic sympathetic ganglionectomy may produce a permanent relief. Conversely, if successful injection of procaine

does not abolish the pain, cervicothoracic sympathetic ganglionectomy is contraindicated.

There are many types of lesions involving not only the cranial nerves but also the structures of the mouth, nasopharynx, and superficial structures, which may be the underlying cause of pain in the face. Pain in this region is usually referred to as "neuralgia," and for this reason it is important to distinguish true neuralgias from the atypical neuralgias of the face, head, and neck. From the standpoint of diagnosis and treatment, it is imperative to remember that there are only two true neuralgias, the first and most common being trigeminal neuralgia, which consists of pain in one or more divisions of the fifth cranial or trigeminal nerve. The second true neuralgia is glossopharyngeal neuralgia which involves the ninth cranial nerve. A third form sometimes is included; this is occipital neuralgia which involves the occipital nerves. There are many pains which simulate these neuralgias, but these pains lack the characteristic onset of neuralgias and the nature of the attacks and the course of the disease are different. These atypical pains do not respond to the treatment which relieves the typical neuralgias; therefore, conservative palliative treatment should be instituted. The question of individual resistance to pain is always of importance in the analysis and treatment of such pain, because patients who have a low threshold to pain not only do not respond satisfactorily to palliative treatment, but are sometimes unsatisfactory patients for the radical procedures used for relief of the major neuralgias.

In cases of trifacial neuralgia the history is typical; there usually is sharp, shooting, lancinating pain which extends along the ramifications of one or more branches of the fifth cranial nerve. There may be a trigger zone or region, which when irritated, causes the onset of the pain. This trigger zone may be on the face, tongue, or gum. The treatment of trigeminal neuralgia consists of either the injection of alcohol into the peripheral branches of the nerve, or radical operation. While the former does not give permanent relief, in our experience at the Clinic it has seemed advisable. Alcoholic injections aid in making a differential diagnosis and help to determine the cases in which the patients will be benefited by operation. While it is true that injections of alcohol are unsuccessful in a small number of cases, if the pain is relieved, one can almost always be sure that the disease is a true trifacial neuralgia. A second reason why alcoholic injection should be considered carefully in the palliative treatment of trifacial neuralgia is the education of the patient. Deep injection of alcohol into the peripheral branches of the nerves usually is followed by relief of pain and numbness of the face. This

anesthesia is sometimes mild and transient in its duration, and it acquaints the patient with the numbness which always follows the section of the nerve. The third reason why alcoholic injections are advisable is the temporary relief of pain in cases in which patients are dehydrated and emaciated before the radical operation is attempted; the injection permits improvement in their general condition. The duration of relief following alcoholic injections is from nine months to many years. The injections can be repeated several times before operation becomes necessary. The ultimate and final treatment of trifacial neuralgia is section of the posterior root of the fifth cranial nerve. Peripheral avulsion has been done, but the results of this procedure are as temporary as are the results of the injection of alcohol.

There are two methods of approaching the fifth cranial nerve, or trigeminal nerve, surgically, namely, the transtemporal and the suboccipital methods. The first type of operation is carried out through a small craniotomy opening made anterior to the ear in the temporal region. The middle meningeal artery is ligated and the dura is reflected from over the sensory root posterior to the gasserian ganglion. After the sensory root has been exposed, a total or a subtotal section can be done, preserving the motor root which descends behind the sensory root and supplies the muscles of mastication.

The second type of operation is carried out through a unilateral suboccipital craniotomy opening. The nerve is exposed as it leaves the pons and before it crosses the petrous bone to enter the middle fossa of the cranium.

The first type of operation permits examination of the gasserian ganglion and contiguous structures for possible lesions which may be causing the pain, and the second permits examination of the pons and associated structures of the posterior fossa. My neurosurgical colleagues and I prefer the transtemporal type of operation and have encountered few postoperative complications in cases in which this procedure was employed. In the series of cases in which it has been employed at the Clinic, the mortality was less than 0.5 per cent in spite of the fact that the majority of the patients were in the later decades of life.

Trifacial neuralgia is the most prevalent of the neuralgias and is associated with probably the most excruciating type of pain. A differential diagnosis is necessary before treatment is begun, because in the absence of a true trifacial neuralgia neither alcoholic injections nor resection of the posterior root will give relief. For this reason, it is necessary to distinguish between the pains along the

course of the fifth nerve, which are caused by involvement of the nerve and its central connections.

In making a differential diagnosis it is important to keep in mind that pain along the course of the fifth nerve may be caused by peripheral lesions, lesions involving the nerve trunks, lesions of the posterior root ganglions, or posterior roots, lesions of the brain stem, lesions in the optic thalamus, lesions in higher associative brain centers, and also by migraine. Peripheral lesions may be the result of trauma which is followed by the formation of scar tissue, pressure by fragments of bone, or inflammation of the nerve endings which is the result of local septic processes producing peripheral neuritis. The lesions involving the nerve trunks may be the result of trauma to the bony canals around the nerve trunk and subsequent formation of scar tissue or tumors which press on the nerve. This frequently occurs in cases of nasopharyngeal malignancy. Local septic processes may involve the nerve trunks and produce interstitial or parenchymatous neuritis, and lesions of the posterior root ganglions or posterior roots, such as ganglionitis or herpes trigeminus, may produce pain along the distribution of the fifth cranial nerve. In addition, tumors arising from the ganglion envelopes or other contiguous tissue, may compress the ganglion. A local meningitis, which is the result of syphilis, or a nonspecific epidemic encephalitis or locomotor ataxia may produce pain in this region. Numerous lesions about the brain stem, such as a tumor in the pons, thrombosis, multiple sclerosis, and arteriosclerotic softening, may be associated with pain in this region. Lesions of the optic thalamus and higher associative brain centers, and migraine, emphasize the necessity for very careful general, as well as neurologic, examination before making a definite diagnosis of one of the major neuralgias.

Glossopharyngeal neuralgia is the second important primary neuralgia. Clinically, it resembles trifacial neuralgia, except that in cases of glossopharyngeal neuralgia the pain follows the distribution of the ninth cranial or glossopharyngeal nerve. The pain is sharp and shooting in character and paroxysmal in its attacks. Instead of spreading over the face, the pain extends from the tonsillar region into the ear. It usually is brought on by drinking either cold or hot liquids, the trigger area being in the tonsillar region. In this type of neuralgia injection of alcohol is of little avail because of the difficulty in injecting the alcohol into the intracranial portion of the nerve. Peripheral avulsions have been tried but they have produced only temporary relief of pain. Intracranial section of the ninth cranial or glossopharyngeal nerve is the only treatment which will give permanent relief. Application of cocaine to the mucous

membrane of the nasopharynx during a paroxysm of glossopharyngeal neuralgia will produce relief. This diagnostic test will distinguish this type of neuralgia from atypical forms. In order to approach the ninth cranial nerve intracranially, it is necessary to do a unilateral suboccipital craniotomy and elevate the cerebellum on the same side. The ninth, tenth, and eleventh cranial nerves make their exit from the skull through the same foramen and the ninth cranial nerve may be easily identified and completely sectioned without producing any change in the tenth or eleventh cranial nerves. This produces anesthesia of the nasopharynx.

Occipital neuralgia is rare and some investigators have questioned whether or not it is a true neuralgia of the occipital nerves which is related to trigeminal and glossopharyngeal neuralgia. Because of its obscure etiology it has been called either idiopathic or symptomatic and it has been observed after direct trauma to the neck. It may follow such infectious disease as malaria, typhoid fever, influenza, cerebrospinal meningitis, and the ordinary cold. Apparently, the most common causes of occipital neuralgia are diseases of the spinal column and diseases of the soft tissues of the neck, among which should be mentioned myositis, cervical arthritis, metastasis of a tumor to the cervical vertebrae, and atlanto-occipital tuberculosis.

The pain in occipital neuralgia is usually situated in the region supplied by the major occipital nerve but may occur in the region supplied by the minor occipital and major auricular nerves. It is described in most cases as a continuous pain with superimposed paroxysms. Usually, there are points which are especially sensitive to pressure. One of these points is situated at the exit of the major occipital nerve. Occipital neuralgia must be distinguished from diseases of the cervical vertebrae, myalgia of the muscles of the neck, occipital migraine, tumors of the spinal cord, and hysteria. In suitable cases the surgical treatment consists of peripheral avulsion, excision of the nerve, or intradural resection of the posterior division of the upper three cervical roots. Before advising operation, a diagnostic injection of procaine should be made. Operation should be carried out only if the pain is immediately relieved by the injection.

Many obscure localized regions of tenderness and pain over the scalp may be caused by various lesions of the structures or they may be a phase of migraine. In one instance in which there was localized pain over the left temporal region, which had been present for three years and was aggravated when the patient coughed or sneezed, the cause was found to be a bony impingement on the

anterior branch of the middle meningeal artery. The pain was completely relieved by making a small bone flap and dividing the middle meningeal artery. Headaches and pains which are situated behind the eyes and over the face and neck may be the result of a physiologic migraine and may respond to general measures rather than to injections or cutting of the nerves or vessels.

There are numerous pains in various parts of the head or face which are not typical of any definite neuralgia and are not confined to the distribution of any cranial nerve. For want of a better term, these conditions have been grouped under the title, "atypical facial neuralgia." This group undoubtedly represents a variety of conditions, some of which are organic, and others, purely functional. While the symptoms vary in individual cases, there are certain characteristics common to a majority of cases. The pain is dull in character and frequently is described as aching, burning, or a pressure pain in marked contradistinction to the sharp cutting or lancinating pains of true neuralgia. Seldom does the patient complain of pain in the anatomic distribution of the fifth, or any other, cranial nerve. The pain in atypical facial neuralgia is generally referred to the temple, the cheek, and the deeper parts within the orbit. It is never on the surface and never extends to the midline. It frequently extends to the posterior auricular and mastoid regions, and in some cases it extends to the neck and arm. The pain may be constant for hours and there are frequent exacerbations. It may persist without intermission for months or years, but during this time it varies in severity. The exacerbations are frequently associated with physical exhaustion, nervousness, or excitement. The differential diagnosis between atypical neuralgias and trigeminal or glossopharyngeal neuralgia should not be difficult because the pain of atypical neuralgia is always deep and continues at least for hours; it is not confined to the distribution of any nerve and it is not associated with a trigger zone. The true neuralgias are characterized by sudden flashes of pain which is felt on the surface, and they always are confined to the distribution of either the fifth or ninth cranial nerve and are frequently induced by touching a certain region called a "trigger zone." Occasionally, the patients have symptoms suggestive of sympathetic origin; other symptoms may be related to migraine, and in these cases ergotamine tartrate should be administered. The severe burning pains associated with lesions of the thalamus strongly resemble some atypical neuralgias and the lesion may actually lie in the structure of the thalamus. If the pain is of a dull aching character and is confined to the distribution of the fifth cranial nerve, it is suggestive of a lesion in the fifth nerve

nucleus and in such a case, section of the sensory root will not produce relief. Certain observations, although not conclusive, point to the sympathetic nervous system as the offending factor in some cases of atypical neuralgia. These include a reduplication of the pain as a result of stimulation of the cervical sympathetic ganglions and relief after the excision of the same ganglions. For this reason, cervical and cervicothoracic sympathetic ganglionectomy have relieved some of these pains.

Sphenopalatine neuralgia, or Sluder's neuralgia, which has been called a "lower-half headache," is an atypical facial neuralgia. There is a question whether or not the sphenopalatine ganglion is involved in this particular condition. According to Sluder, the symptoms are practically always preceded by a coryza. This is followed by pain which is situated at the root of the nose, in and around the eye, and in the upper jaw and teeth. At times, the pain may be felt in the lower jaw and teeth. The chief pain may be situated above the zygoma and deep in the eyeball. Frequently the pain extends to the ear, mastoid region, occiput, and neck; it also has been referred to the shoulder and arm. The pain is always described as dull, burning or slowly boring. While this syndrome has not been accepted as a clinical entity. Sluder recommended cocaineization of the sphenopalatine ganglion. Some patients are immediately relieved by placing a cotton pledget which has been moistened with a saturated aqueous solution of cocaine, above the middle turbinate bone. In some cases patients have been relieved by one or two applications, although in some cases in which the neuralgia has been present for a long time, patients have not been relieved except by the injection of alcohol into the region of the sphenopalatine ganglion.

Before deciding on surgical treatment of painful syndromes about the head and neck, certain general and local diseases must be considered and ruled out. In doubtful cases, certain diagnostic injections of procaine and alcohol, or applications, especially in cases in which trigeminal neuralgia, glossopharyngeal neuralgia, occipital neuralgia, hemicrania of migraine, or other neuralgic-like pains are present, will indicate the amount of relief to be expected from an operation on the central or sympathetic nervous system.

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THE SOUTH'S CONTRIBUTIONS TO GYNECOLOGY

It seems fitting that important contributions to gynecology should be made in the South, a land noted for its chivalry. In Garrison we read that "operative gynecology had no special existence before the beginning of the nineteenth century, and was largely the creation of a number of surgeons from the Southern States, and had its origin in the attempt to repair the errors and omissions of backwoods obstetrics." Crude midwifery must exist in all pioneer communities. All honor to those who have succeeded in correcting it! Of nine contributions listed in Herbert Thoms' enumeration of classic contributions to gynecology, two are by Englishmen: Spencer Wells and Lawson Tait; and of the remaining seven contributors, four are by Southerners: McDowell, Battey, Sims and Emmet, the other three Americans being Nathan Smith, Washington Atlee and the German-born Noeggerath.

Most of the contributions described in the present paper were made by Southern gynecologists practicing in the South, although later they may have moved to other parts of the country. Jesse Bennett was born in Pennsylvania, but practiced all his life in the Valley of Virginia. Emmet was a native Virginian, but achieved his great reputation in New York City. Probably the gynecologic work of other Southern practitioners entitle them to be named in this group, but they are not mentioned because they left no written record of their accomplishments.

Read before the C. Jeff Miller Memorial Session of The Southeastern Surgical Congress, in Charlotte, March 9, 1937.

WILLIAM BAYNHAM, 1749-1814

The first recorded contribution of a Southerner is by William Baynham (1749-1814) of Essex county, Virginia, who in 1790, and again in 1799, operated successfully for ectopic pregnancy. He described his operation in the *New York Medical and Physical Journal and Review*, Volume I. Born in Caroline county, Virginia, in 1749, Baynham, after serving an apprenticeship under a local physician, entered St. Thomas' Hospital in London, where he established an enviable reputation in anatomy and surgery. He was assistant demonstrator of anatomy for five years and later became a member of the Surgeon's Company of London, giving him equal rank with the first surgeons of the day: such as Pott, Cooper, Abernathy and John Hunter. After remaining sixteen years in England he spent the rest of his life in Virginia, where he built up an enormous practice. His biographer says that Physick and Baynham did more than any other men of the day to improve their calling. Baynham is known to anatomists as the discoverer and demonstrator of the vascularity of the rete mucosum.

JESSE BENNETT, 1769-?

Miller, quoted by Packard, in his *History of Medicine in the United States*, describes what he considers the first successful cesarean section performed in America. The operator was Dr. Jesse Bennett, a country practitioner in the Valley of Virginia, and the patient was Dr. Bennett's own wife. The operation was performed Jan. 14, 1794.

Bennett was born in Frankford, Pennsylvania in 1769; the date of his death is not known. He is said to have studied medicine at the University of Pennsylvania, but the records do not show his name as a graduate. In 1792 he began to practice in the Valley of Virginia, and married Elizabeth Hog the next year. Mrs. Bennett became pregnant but when the time arrived for her delivery it was found impossible owing to a contracted pelvis or some other obstruction. Another physician was summoned to perform cesarean section or craniotomy, but when he refused Dr. Bennett himself proceeded with the section. Mrs. Bennett, thinking she was going to die anyway, insisted that the child should be saved. The patient was given a large dose of laudanum, and placed on a table made of two planks between two barrels. Dr. Bennett with one quick stroke of the knife laid open the abdomen and uterus. Enlarging the opening in the uterus with his hands, he quickly lifted out the child and the placenta. Before closing the wound, which he did with stout linen thread, he remarked, "This shall be the last one," and removed both ovaries. Both the mother and child survived and lived

many years. This remarkable undertaking was verified by reliable witnesses.

EPHRAIM McDOWELL, 1771-1830

The two outstanding pioneer gynecologists of the South were Ephraim McDowell, of Kentucky, and J. Marion Sims, of Alabama. The interesting and inspiring careers of these men have been so lately called to our attention by able writers that only brief sketches will be offered at the present time. McDowell was born in Rockbridge County, Virginia in 1771, and in 1782 moved with his father to Danville, Kentucky, where he lived the remainder of his life. He studied medicine under local doctors for several months, and spent the session of 1793-94 at the University of Edinburgh, with the brilliant John Bell, who was the foremost Scottish surgeon of his generation. McDowell received no diploma in medicine from Edinburgh, and did not receive one from any institution until 1825, when the University of Maryland gave him its honorary M.D.

In 1795 young McDowell began practicing in Danville, and soon became the leading physician and surgeon in his section. He performed with success every surgical operation then practiced. Up to 1828 he had done twenty-two lithotomies without a death. He operated many times for strangulated hernia, and did successfully various amputations and ligations. His chief claim to fame, however, rests upon the fact that he was the first to open the human abdomen and remove an ovarian tumor, which he did in 1809, with the recovery of the patient. Admiration for this feat is enhanced when it is recalled that anesthesia, antisepsis and skilled assistance were unknown. Altogether McDowell performed the operation thirteen times, with eight cures, four deaths, and one failure when he was unable to complete the operation because of extensive adhesions.

The story that an angry mob was waiting outside to attack McDowell has been refuted, although the event caused great excitement among the three hundred inhabitants of Danville. The patient, Jane Todd Crawford, rode sixty miles on horseback to submit to the operation, the large tumor resting on the horn of her saddle. It is fitting that she be considered as much a heroine as the surgeon was a hero, in submitting to the operation under the circumstances, and it is gratifying that a monument has been erected to her memory in Danville beside that of Dr. McDowell. Recently McDowell's office, in which the memorable operation occurred, has been rehabilitated to serve as a museum for preserving relics of McDowell and other Southern surgeons.

McDowell almost robbed himself of the credit of priority in this operation because he did not publish it until 1817,⁴ and then his report was so incomplete that its reliability was doubted. However, following much discussion, especially in England, Dr. Johnson, one of McDowell's severest critics, in 1826, admitted: "A back settlement of America—Kentucky—has beaten the mother country, nay Europe itself, with all the boasted surgeons thereof, in the fearful and formidable operation of gastrotomy, with extraction of the diseased ovaria." Contenders in various parts of the globe claimed to have preceded McDowell in the operation, but the last vestige of doubt as to whether he was entitled to be called the "Father of Ovariectomy" was felt to be removed in 1852, by Dr. Samuel Gross, regarded as the leading surgeon of the day, in a convincing address which he delivered before the Kentucky State Medical Society.

JOHN KING

Dr. King's birthplace, and the dates of his birth and death are unknown. He lived at Edisto Island, South Carolina, and in 1816 performed an unusual operation for extrauterine pregnancy,⁵ saving both mother and child by cutting through the walls of the vagina and applying the forceps with abdominal pressure exerted upon the fetus from above. He published his observations in a book which was issued at Norwich, England, in 1818, entitled, "An Analysis of the Subject of Extra-uterine Foetation, and of Retroversion of the Gravid Uterus," said to be the first book on the subject.

CRAWFORD W. LONG

While Crawford W. Long (1815-1878), of Georgia, cannot be looked upon as a gynecologist, the fact that he was the first to employ anesthesia in a surgical operation (Jefferson, Georgia, March 30, 1842) entitles him to a place among the immortals in all branches of surgery. In a recent letter to the author (1936) Mrs. Eugenia Long Harper, sole surviving child of Dr. Long, writes that Long used ether in delivering his second child, who was born December 27, 1845, a date attested by the record in the family Bible. Mrs. Harper says that the family often heard their mother declare that Dr. Long put her asleep with ether at this time. Long's biographers have always said that one of the main reasons he sought an anesthetic was to relieve women of the pains of childbirth, and the date Dec. 27, 1845 probably would have come to light earlier if the daughter who was born at that time had been willing to confess her age! It also happens that this particular daughter, who was well known to the author, was the most active of all Crawford Long's children in working to maintain her father's

priority in the discovery of anesthesia! We read in the Encyclopedia Britannica that Sir James Y. Simpson employed ether in obstetrics in 1846, and was the first to use chloroform, in 1847. If these dates are correct, Long not only first used ether anesthesia in a surgical operation, but also was the first to use an anesthetic in obstetrics.

JAMES MARION SIMS, 1813-1883

The career of Marion Sims was one of the most successful and spectacular in the annals of medical history. Of no physician or surgeon can it be said with more truth that his life reads like a romance. Think of a South Carolina schoolboy becoming physician to an empress! Imagine a doctor from the canebrakes of Alabama being invited to operate before a company consisting of Velpeau, Nelaton, Ricord, Malgaigne, Huguier and others of equal renown! Probably no American surgeon has had more articles written about him than Dr. Sims. He is so fascinating to write about! Recently Irvin Abell, George Gray Ward, Seale Harris and Hubert Royster have done the job exceptionally well, leaving but few details to be recounted in the present abbreviated description.

Dr. Ward epitomizes Sims' contribution to gynecology as follows: "Gynecology as an independent specialty had no existence as such until the latter half of the nineteenth century, and the impetus which started its development originated in this country as a result of the genius and persistent efforts of J. Marion Sims who founded the Woman's Hospital in New York from whence proceeded gynecological teaching that spread throughout the world. Until that time little was known and less done to alleviate the sufferings women had to endure, and gynecologic practice was limited to the use of a tubular speculum through which erosions of the cervix were treated with solutions of nitrate of silver, the employment of an infusion of red oak bark for leucorrhea, and a spherical pessary for the relief of prolapse. Operative gynecology was rarely attempted. Sims gave the impulse which upset the do-little, conservative treatment of diseases peculiar to women which then prevailed, and opened wide the field of active, surgical, scientific methods which are now in vogue."

Dr. Abell made the life of Sims the subject of a scholarly presidential address before the Southern Medical Association. Dr. Harris refers to Sims as the Founder of Modern Gynecology, and describes him as a resident of three states, South Carolina, Alabama and New York. He was born in Lancaster, South Carolina, Jan. 25, 1813, and lived near Montgomery, Alabama, from 1835 to 1853, when he moved to New York City, where he died in 1883.

Dr. Royster tells of his contributions to surgery outside of gynecology.

One morning in June, 1845, after he had located in Alabama, Dr. Sims was called to see a woman who had been thrown from a horse and was complaining of great pain in her back and pelvic region. Examination revealed a retrodisplacement of the uterus. He put the patient in the knee-chest position (later modified to Sims' position), and inserted two fingers in the vagina in the effort to push the womb into place. To his great surprise there was an inrush of air which dilated the vagina and exercised pressure enough to carry the displaced organ into position. The ballooning of the vagina by atmospheric pressure brought all parts of this hitherto inaccessible surgical region into full view. Quick to appreciate the importance of this discovery he immediately bought a set of pewter spoons of various sizes and bent the bowl and handle of one of these at a right angle. Now getting one of his patients suffering with vesico-vaginal fistula in Sims' position, he inserted the improvised speculum, and atmospheric pressure accomplished the rest. This was the origin of Sims' speculum. He then had a perfect view of the fistulous opening, something no man had ever seen before.

He operated upon this case soon afterwards, but the operation was a failure. Many such operations failed. He built a private hospital in Montgomery, collected all the patients he could (mostly negro slaves), kept them at his own expense and began a regular series of scientific experiments, founded on physiologic and pathologic laws. And still he failed. Antisepsis had not been discovered. Altogether Dr. Sims toiled for four years and spent a large part of his private fortune before a single case was cured. He operated more than forty times on three patients, and twenty-one times on one of them.

At last he discovered that the silk sutures he was using were all becoming infected. In the midst of his perplexity, one day, he noticed on the sidewalk a bit of brass wire which had been attached to a pair of suspenders to act as a spring or elastic. It was very fine and seemed to be just what he needed. Taking it to a silversmith he had some silver wire made of the same size. With this he went to work at the operation again. His famous colored patient, Anarcha, was chosen, and he performed his thirteenth operation on her. He says, "With palpitating heart and anxious mind, at the end of a week I looked at the wound for the first time, and it had entirely healed; without redness or inflammation, and Anarcha was cured!"

Many patients were thus made well, the first in 1849. On moving to New York Sims founded the Woman's Hospital, and built up a

large practice. He wrote well and voluminously, one of his best known books being on uterine surgery. He made several trips abroad, and immediately commanded a lucrative practice in every European capital he visited: Paris, London, Berlin, Vienna, Rome, Madrid, Lisbon, Brussels and St. Petersburg, his patients being members of royalty and the highest society. While successful in the treatment of many diseases peculiar to the female sex, Marion Sims' reputation depended largely upon his cure of vesico-vaginal fistula. He was president of the American Medical Association in 1876, and in 1880 he filled the same office in the American Gynecological Society.

JOSIAH CLARK NOTT, 1804-1873

Dr. Nott was born in Columbia, South Carolina, and practiced in Columbia, Mobile, Baltimore and New York City. It did not seem unusual in those days for prominent members of the profession to move from city to city. For one term Dr. Nott held the chair of anatomy in the University of Louisiana. He produced many valuable papers. Among his many valuable papers he published in March, 1848, he published an article on yellow fever in which he expressed the belief that it was of insect or animalcular origin. Skene, in his "Diseases of Women," says "coccydynia" was first described by Dr. Nott in the North American Medical Journal, May, 1844, but it attracted little attention until 1861, when Sir J. Y. Simpson revived the subject and gave it the name of "coccygodynia."

NATHAN BOZEMAN, 1825-1905

Dr. Bozeman was one of the best known gynecologists of New York. He was a native of Alabama, and studied medicine at the University of Louisville where he was a pupil of Samuel Gross. Afterwards he became Gross' assistant professor, and had the distinction of chloroforming the patient in the first successful ovariectomy done under anesthesia, Prof. Henry Miller being the surgeon. Bozeman located in Montgomery, devoting himself mainly to diseases of women. He improved upon Marion Sims' clamp suture in vesicovaginal fistula by introducing the "button suture." In 1858 he visited Europe and introduced some of his operations for vesico-vaginal fistula, and the next year he opened a hospital in New Orleans for diseases of women and acted as visiting surgeon to the Charity Hospital.

After serving as a Confederate Army surgeon Dr. Bozeman located in New York where he opened a woman's hospital. He performed many ovariectomies, and was one of the first to become interested in surgery of the female urinary tract. He was especially

interested in the complication of pyelitis which he treated by catheterizing the ureter through the vesico-vaginal opening (1887).¹¹

ROBERT BATTEY, 1828-1895

Dr. Battey was born in Augusta, Georgia, Nov. 26, 1828, and received his preliminary education in the Richmond Academy, Augusta, and Phillips Academy, Andover, Massachusetts. He studied medicine at the University of Pennsylvania and Jefferson Medical College, graduating from the latter in 1857, and receiving its LL.D. in 1891. Later he visited the Paris hospitals. With the exception of the years devoted to the Confederate Army as surgeon, and the time (1872-75) spent in Atlanta as professor of obstetrics in the Atlanta Medical College and editor of the Atlanta Medical and Surgical Journal, Battey lived all his professional years in Rome, Georgia.

"Battey's operation"—oophrectomy—was first done by him in Rome in 1872, and reported the same year.¹² The patient was 30 years old and had been an invalid for 16 years, having menstruated only twice. Both ovaries were removed by abdominal section and the woman cured. Battey afterwards tried vaginal section but reverted to his first method. So far as Battey knew, his operation had no precedent. His idea was to remove the ovaries, whether diseased or not, to do away with painful menstruation and neurotic symptoms, whereas Lawson Tait removed the uterus and appendages only when they were diseased.

Courage of a high order must have been required to do the first oophrectomies. T. A. Remy¹³ writes that Dr. Battey told him how a band of men, among them prominent physicians of the community, awaited the results of his first case, intending, in case of the patient's death, to have him arrested and prosecuted for murder. The principles of his operation laid the foundation for the surgical treatment of many pelvic conditions which was to be developed later by such men as Hegar in Germany and Tait in England.

THOMAS ADDIS EMMET, 1828-1919

The South's claim to Thomas Emmet is that he was born at Charlottesville, Virginia, the son of a member of the faculty of the University of Virginia. He graduated in medicine from the Jefferson Medical College, in 1848, and practiced all his life in New York City. He succeeded Sims at the Woman's Hospital, and from 1855 to 1872 he carried the whole surgical responsibility of the institution, and this was the period of his most important work. In 1868 he published his report of 600 cases of vesico-vaginal fistula. He gave us the plastic operations for the cure of lacerated cervix,

rectocele, cystocele, rectovaginal fistula, laceration and prolapse of the urethra. He first performed those plastic operations of marvelous mechanical ingenuity and patience of restoring the whole vagina ("butterfly denudation"), together with the base of the bladder and the urethra after they had sloughed away, giving the patient retentive power. Dr. Emmet invented well nigh all the instruments used in plastic gynecology.¹⁴ Toward the end of his long career he wrote "Personal Reminiscences of My Life," a work not only telling of his fascinating and inspiring experiences, but also affording an interesting historical survey of his time.

THEODORE GAILLARD THOMAS, 1831-1903

Thomas was another of the famous gynecologists who was born on Edisto Island, Charleston, South Carolina. He also practiced in New York City, after graduating from the Medical College of the State of South Carolina in 1852. At first he did general practice, specializing in obstetrics. After becoming attending surgeon to the Woman's Hospital in 1872, he devoted himself to gynecology. He was a teacher, author and surgeon of the highest type. His most important book was "A Practical Treatise on the Diseases of Woman," in 1868, the first distinct work on the subject ever published. Gynecology had been making rapid strides during the previous few years, chiefly from the impetus given by Marion Sims, but the record of its progress was found merely in special monographs, journals and transactions of societies. So Thomas' excellent book came at an opportune time, was translated into French, German, Italian, Spanish and Chinese, and sold 60,000 copies, extending his fame throughout the world.

GEORGE HENRY NOBLE, 1860-1932

Dr. Noble's contributions to gynecology carried on the pioneer fundamentals laid down by Sims, Emmet and Thomas. His plastic operations in the female pelvis have not been excelled. His mechanical ability was so conspicuous that friends felt when Dr. Noble became a gynecologist the profession lost a great orthopedic surgeon. He was born in Atlanta, graduated in medicine from the Atlanta Medical College in 1891, and practiced in Atlanta, being known always as a gynecologist. He was one of the founders of the Atlanta School of Medicine in 1905. Later he became Professor of Gynecology in the revived Atlanta Medical College, and at the time of his death was Emeritus Professor of Clinical Gynecology in the Medical Department of Emory University. He contributed sixty-four papers to medical literature, mainly on subjects related to the diseases of women. Among other distinctions he was president of the Southern Surgical and Gynecological Association, vice-

president of the American Gynecological Society and an Honorary Fellow of the Southeastern Surgical Congress.

C. JEFF MILLER, 1874-1936

The Southeastern Surgical Congress mourns the passing of a distinguished Southern gynecologist who at the time of his death was president of the organization, Dr. C. Jeff Miller, Professor of Gynecology in Tulane University, New Orleans. The present paper is dedicated to his memory, but a detailed description of Dr. Miller's fine qualities and outstanding achievements is omitted in view of the complete biographical data given at this meeting by other speakers. Jeff Miller was a worthy successor to the other gynecologists of this group. He was born in Winchester, Tennessee, graduated in medicine from the University of Tennessee in 1893, and devoted his life to practicing and teaching gynecology in New Orleans. He was the author of two textbooks, as well as innumerable articles on scientific subjects. He was president of the Southern Surgical Association in 1922, president of the American Gynecological Society in 1928-29, and president of the American College of Surgeons in 1930-31.

In his obituary note, Alton Oschner says of Dr. Miller, "As a teacher he was unsurpassed, primarily because of his profound knowledge of the subject, and also because of his lucid and superb presentations. Even during the most trying operative procedures he lectured clearly, and his operative clinics were always filled to their maximum capacity. He was truly a Southern gentleman."

FRANK K. BOLAND, M.D.

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BOOK REVIEWS

The Editors of THE SOUTHERN SURGEON will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The Editors do not, however, agree to review all books that have been submitted without solicitation.

THE THYROID AND ITS DISEASES. By J. H. MEANS, M. D., Jackson Professor of Clinical Medicine, Harvard University, and Chief of the Medical Services, Massachusetts General Hospital. 602 pages with 73 illustrations. Price, \$6. Philadelphia: J. B. Lippincott Company, 1937.

The thyroid clinic of the Massachusetts General Hospital for more than two decades has been studying diseases of this organ with a two-fold purpose: to care for the patient in the best possible way and to learn from him something new about his disease. This book presents an account of the personal experiences of the workers in this clinic and of their conclusions. It does not pretend to be an encyclopedic treatise of the subject but it does cover the thyroid and its disorders in a most satisfactory manner. While the approach is essentially clinical the author has striven to integrate with this approach anatomy, physiology and biochemistry. For example, the discussion of myxedema is a classic.

One of the most noteworthy features, which may be surprising to some of those who do not greatly love the Bostonians, is the openmindedness of the book and the emphasis that the opinions presented are not to be compared to the laws of the Medes and Persians: indeed in the course of writing this book the author has changed his mind more than once and there is therefore an occasional inconsistency, but after all consistency is a vice of small minds.

Dr. Means believes that the cause of goiter is unknown and that until this is discovered the best treatment of thyrotoxicosis is, after a preliminary course of iodine, subtotal thyroidectomy. He emphasizes the importance of the inspection of the vocal cords for mobility before the operation. Not a great deal of space is devoted to the technical details of surgery but the postoperative management is covered fully.

He believes that the prolonged use of iodine, rather than being injurious in itself, merely puts on the brakes in hyperthyroidism. He does not believe that iodine administration will bring on such a condition.

This group holds that goiter in itself does not damage the heart. It maintains, and cites cases to prove, that it is impossible to be sure of the presence of valvular disease in cases of hyperthyroidism.

The reviewer is proud of having served under that true scientist and great clinician, the late Henry S. Plummer; he is still his devoted disciple. Where Means writes in harmony with Plummer's teachings, the reviewer thinks the book is splendid.

Means prefers the term "nodular" to "adenomatous": pathologically, not all thyroid nodules are adenomas and therefore a clinician should not attempt to be more precise than he can be; this proposed change may be an improvement. Means does not mention Plummer's insistence that an asymptomatic adenomatous goiter should be removed before doing any other surgical procedure except one that is immediately necessary to save life. This is the only sin of omission noted. Means does not accept Plummer's hypothesis that in exophthalmic goiter there is a hypersecretion of the normal thyroid hormone plus the elaboration of a toxin (responsible for the exophthalmos, excess emotionalism, etc.) which is probably a thyroxin-like substance insufficiently saturated with iodine. Although this hypothetical substance has never been

isolated, it would seem that Plummer had proved its existence clinically: in several cases in which the exophthalmos grew worse after the reduction of the basal metabolic rate by thyroidectomy, iodine benefited the eye symptoms but resulted in myxedema and the patient was finally clinically cured by the administration of both iodine and thyroid extract. Means devotes a short section to the treatment of such malignant exophthalmos and mentions thyroid extract, but would appear to have missed the kernel. Means substitutes for Plummer's "adenomatous goiter with hyperthyroidism" the term "Plummer's disease." The reviewer is inclined to think that Plummer himself would not consider this an improvement.

He divides the hyperthyroid state into "Plummer's disease" at one end with imperceptible gradations into frank exophthalmic goiter at the other. He advises iodination in all such cases before operation.

The reviewer still holds to Plummer's opinion that exophthalmic goiter and adenomatous goiter are distinct entities, and that preoperative iodination is of great value only in cases of exophthalmic goiter; that confusion arises because in more than 20 per cent of exophthalmic goiter adenomas are also present. However, he knows that even the most expert occasionally fails to recognize that exophthalmic goiter is present, and therefore he is willing to agree with Means that in all cases of hyperthyroidism a short course of iodination preliminary to thyroidectomy is advisable.

The discussion of total thyroidectomy in the treatment of severe heart failure is illuminating. From the groups of cases operated on at the General and at two other Boston hospitals, Means concludes that this operation is "worth while" in about one out of four cases of congestive heart failure and twice as often in cases of severe angina.

The book is clearly written. The illustrations are hardly as plentiful as one might expect. There are many humorous touches but the quality of Dr. Means' humor is not like that of mercy.

"The Thyroid and its Diseases" should be owned by everyone who is particularly interested in the subject and should at least be read by all those who treat patients in whom the possibility of thyroid disease may arise.

THE MANAGEMENT OF OBSTETRIC DIFFICULTIES. By PAUL TITUS, M. D., Obstetrician and Gynecologist to the St. Margaret Memorial Hospital, Pittsburgh; Consulting Obstetrician and Gynecologist to the Pittsburgh City Homes and Hospital, Mayview, and to the Homestead Hospital, Homestead, Pa.; Secretary of the American Board of Obstetrics and Gynecology. 879 pages with 314 illustrations, including 4 color plates. Price, \$8.50. Saint Louis. The C. V. Mosby Co., 1937.

The subject is covered in a very complete manner, embracing all difficulties from sterility to and including care of the new born infant. If the careful examination and care of the expectant mother recommended were more generally known and practiced, there would be fewer difficulties to handle later. His recommendation of conservatism in performing caesarean section, handling posterior presentations, and treating toxemias of pregnancy, if followed, should save many lives.

Doctor Titus' broad experience and complete knowledge of the literature, combined with excellent arrangement and style, make this book a real con-

tribution to medical literature. The fact that general practitioners in small communities deliver the majority of women is kept in mind throughout the greater part of this book.

ENOCH CALLAWAY, M. D.

CHRISTIAN R. HOLMES, MAN AND PHYSICIAN. By MARTIN FISCHER. 233 pages, with illustrations. Price, \$4. Springfield and Baltimore: Charles C Thomas, 1937.

Christian R. Holmes was born in Denmark and during his adolescence his family moved to the United States. After various vicissitudes, a fortunate illness brought him in contact with Dr. Elkanah Williams who inspired him to study medicine. He worked his way through medical school and soon was a distinguished young doctor. From the time he came to the Cincinnati Hospital in 1885 however his life was devoted primarily to the interests of the hospital. Fischer traces out the work he did for this institution and gives a most interesting account of the dirty politics involved in what was then reputed to be the worst governed city in the country. His vision and energy were principally responsible for the great success of this hospital and medical school. Would to God that a Southern city of which this reviewer wots could get a Christian R. Holmes.

The book is so delightfully written that it is in itself a work of art. It is to be feared however that it will appeal chiefly to those who knew Dr. Holmes, to those who are interested in Cincinnati medicine and to those who have followed the course of medical education and medical advancement in the United States in their great activities of the last thirty years.

The book is an edition de luxe. The paper and typography are superb. And yet the bizarre capitalization and punctuation will be annoying to some.

MEDICAL MORALS AND MANNERS. By HUBERT ASHLEY ROYSTER, M. D. 333 pages. Price, \$2.50. Chapel Hill: The University of North Carolina Press, 1937.

In ancient times the priest and the physician were often one and the same and in this country among the Indians the medicine man has not yet died out. The priest of ancient Egypt and the medicine man had in common the conviction that the healing art must be clothed in mystery and it was not so long ago that the successful physician wore a stove pipe, a Vandyke and a frock coat and wished to appear as pontifical and mysterious as Imhotep. Today however there is a rapidly growing tendency to inform the laity that modern medicine is founded in science and that in science there are no secrets. It is unworthy of us to dignify the various cults with our condemnation but for the benefit of the long-suffering public we should inform them as to what scientific medicine means. We should let them know that medical ethics is neither artificial nor fossilized, that it is not for the enhancement of either the dignity or wealth of the practitioner; but that medical ethics is a vibrant code of honor, the product of centuries of experience in medical practice and that its principal virtue is that it serves the welfare of the sick.

In this day when we wish the laity to know what it is all about, we can devise no better means of accomplishing this end than to present our friends outside of the profession with a copy of Hubert Royster's Medical Morals and

Manners. The wise physician however, before parting with a copy will spend two or three very delightful evenings in reading it himself.

These little essays cover a wide variety of subjects, from "Why Golf?" to "The Medical Phrases of Victor Hugo," from "Facts All Should Know about Appendicitis" to "The Hospital Manner," which originally appeared in these pages. Among the most interesting chapters are the biographic notes on "Budd of Chatham" and "Edmund Strudwick, Surgeon," the latter of which was also published here. Too many physicians pass on to their reward loved and honored only by those whom they served and it is a great pity that more of them, particularly in the South, have not been immortalized by such graceful tributes. It is a pity too that so few physicians since Osler have contributed to belles lettres.

The catholicity of his interests, which reflect his abundant life, the penetrating insight of a distinguished surgeon, and the polished style of a cultured gentleman all serve to make of this book a gem.

HANDBOOK OF ORTHOPAEDIC SURGERY. By ALFRED RIVES SHANDS, JR., B. A., M. D., Associate Professor of Surgery in Charge of Orthopaedic Surgery, Duke University School of Medicine, and Chief of the Orthopaedic Service, Duke University, Durham, N. C.; Member of the American Orthopaedic Association, The American Academy of Orthopaedic Surgeons, and the International Society of Orthopaedic Surgery. In Collaboration with RICHARD BEVERLY RANEY, B. A., M. D., Instructor in Orthopaedic Surgery, Duke University School of Medicine. 593 pages with 169 illustrations. Price, \$5. St. Louis: The C. V. Mosby Company, 1937.

This volume is designed to serve usefully as a textbook for undergraduate students and few except expert orthopedic surgeons can fail to find in it much with which they are not familiar.

The book is carefully edited and it represents much more than the authors' individual ideas as twenty-four teachers of orthopedic surgery have contributed suggestions and criticisms.

The roentgenograms have been traced over so as to bring out the important parts and those illustrations which are not original have been redrawn so as to present a pleasing uniformity and clarity.

PREOPERATIVE AND POSTOPERATIVE TREATMENT. By ROBERT L. MASON, A. B., M. D., F. A. C. S., Assistant in Surgery at the Massachusetts General Hospital. 495 pages with 123 illustrations. Price, \$6 net. Philadelphia and London: W. B. Saunders Company, 1937.

Preoperative and postoperative treatment is covered in detail for each type of operative procedure, and there are also special chapters which deal with patients suffering from cardiac disease, nephritis, and diabetes. Detailed diet lists are included.

The subject matter is well arranged for quick reference. Treatment recommended is sound and based both on physiological principles and on tested clinical experience. This work should prove very valuable to students and surgeons whose experience is not sufficient to produce ready familiarity with surgical complications.

ENOCH CALLAWAY, M. D.

